

# Mining

CONGRESS JOURNAL



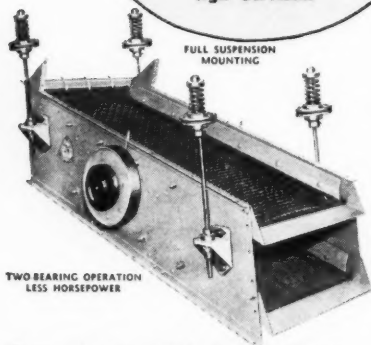
OCTOBER  
1956



# DENVER CAN SUPPLY COMPLETE EQUIPMENT FOR YOUR MILL

**One Responsibility**

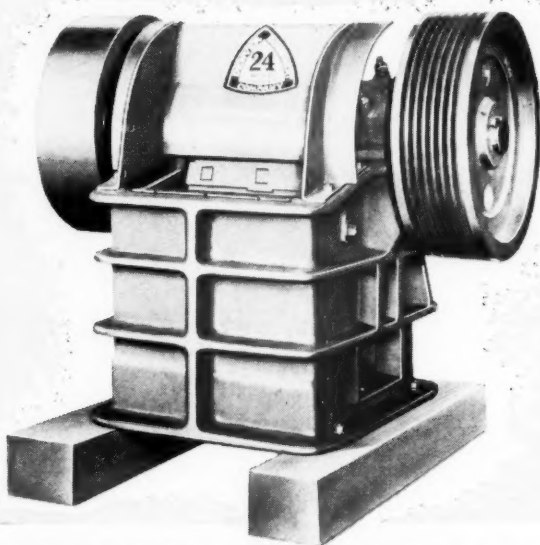
Agitators, Ball-Rod Mills, Classifiers, Conditioners, Crushers, Dryers, Feeders, Filters, Flotation, Jigs, Pumps, Samplers, Screens, Thickeners, Ore Testing and Mill Design Services.



**Save Up to 50% Power Costs  
with DENVER-DILLON  
Vibrating Screens**

- Lower Power Cost with two-bearing operation and suspended assembly.
- Positive rapid vibration through "floating circle" action.
- Low operating cost.
- Rugged, simple construction.
- Sizes to 6' x 14', single or multiple decks.

For complete information, WRITE FOR BULLETIN NO. S3-B13.



## DENVER FORCED FEED JAW CRUSHERS

**Assure Long Life in Heavy Duty Operation**

### 1. ANTI-FRICTION BUMPER BEARINGS

Pitman bearing troubles—the most serious problem with bronze bearing crushers—have been eliminated by using oversize, heavy-duty roller bearings for the Pitmans on Denver type "H" Jaw Crushers. Prices are comparable to all-bronze-bearing crushers.

Two types of crushers are available—type "H" has anti-friction bumper bearings and bronze side bearings. Type "J" has anti-friction bearings for bumper and side bearings. Available in sizes 5" x 6" to 36" x 48".

### 2. LONG-LASTING JAW PLATES

Genuine 13-14% manganese cast steel is used for jaw and cheek plates on Denver Jaw Crushers. Jaw plates are reversible so that service life is greatly increased and replacement costs cut.

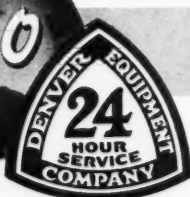
### 3. HIGH STRENGTH FRAME

The steel frame of Denver Jaw Crushers is heavily reinforced to withstand more than the most severe service it will meet in its size reduction range.

For complete information about Denver Jaw Crushers, WRITE FOR BULLETIN No. C12-B12.

*"The firm that makes its friends happier, healthier and wealthier"*

**DECO**  
ENGINEER



## DENVER EQUIPMENT CO.

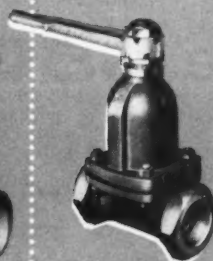
1400 Seventeenth St. • Denver 17, Colorado  
DENVER • NEW YORK • CHICAGO • VANCOUVER • TORONTO  
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# ALL-PURPOSE VALVE

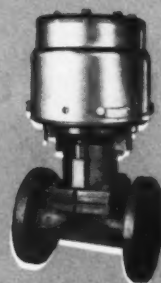
for handling materials as diversified as corrosive fluids, gases, beverages, viscous materials, foods, compressed air, solids in suspension.



Handwheel Operated



Lever Operated



Power Operated

## Grinnell-Saunders Diaphragm Valve

Unsurpassed on lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are costly factors.

In industries as varied as mining, food, textile, pulp and paper, beverage, water and sewage, chemicals . . . Grinnell-Saunders Diaphragm Valves continue to win enthusiastic acceptance. The unique design of the valve — with its flexible, long-wearing, tight-closing diaphragm — offers many unusual advantages.

If you have a valve problem, it will pay you to write Grinnell for further information.

# GRINNELL

WHENEVER PIPING IS INVOLVED

### Choice of Materials

**Bodies** — iron; cast steel; stainless steel; Durimet 20; Hastelloy A, B, C; bronze; Monel; aluminum; PVC (polyvinyl chloride); Saran

**Body linings** — hard rubber; soft rubber; neoprene; glass; lead; plastics; Heresite; Lithcote

**Diaphragms** — soft natural rubber; natural rubber; white synthetic rubber; neoprene; reinforced neoprene; butyl; Hycar; Teflon; Kel-F; PVC (polyvinyl chloride); polyethylene

**Bonnets** — iron; stainless steel; bronze; other materials on special order

### Choice of Bodies

Conventional weir type

**Straight bodies** — screwed; flanged; socket weld; butt weld; socket (solder); sanitary threads; hose ends; Victaulic

**Angle bodies** — screwed; flanged; socket weld

Other types

A line of Straightway Valves (for straight-thru flow) and Full-Bore Valves (for ball brush cleaning) also are available

### Choice of Bonnets

Handwheel (non-indicating stem, indicating stem); chain wheel; lever (for quick operation); sliding stem (for a wide selection of power operated topworks)

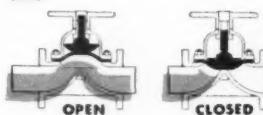
### Operating Features

- diaphragm absolutely isolates bonnet mechanism from the fluid in the line

- diaphragm lifts high for streamline flow in either direction

- diaphragm presses tight for positive closure

- simple maintenance — diaphragm easily replaced without removing valve body from line



Grinnell Company, Inc., Providence, Rhode Island

Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves  
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies  
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

# Fast-moving **Jeffrey** produce **650 tons per shift**

**A**T MINNEHAHA MINE of Fairview Collieries Corporation near Dugger, Indiana, old track-mounted Jeffrey equipment has been replaced with two completely new units of modern Jeffrey apparatus, with highly satisfactory results in production.

Each Jeffrey unit performs the complete mining cycle, and it consists of a roof drill, face drill, cutter, loader and two shuttle cars, with a fifth car held in reserve for use

by either unit.

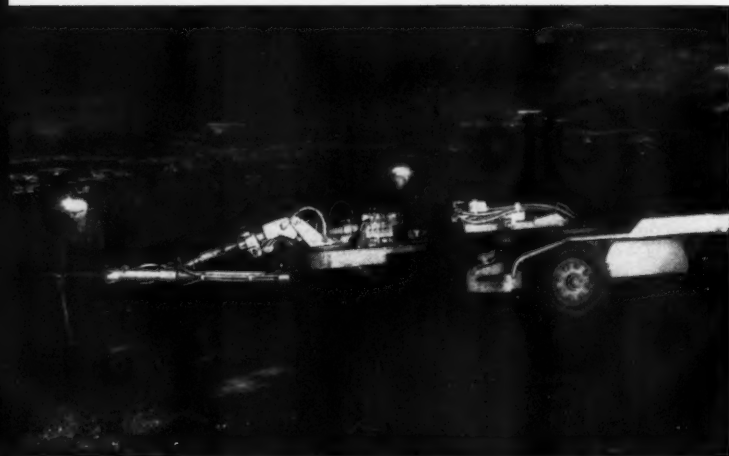
Average output of each unit is 650 tons per shift. Peak tonnages of 830 per shift have been reached. The pictures and captions tell the performance story of the fast-moving Jeffrey machines which constitute each unit.

Find out how this Jeffrey combination can boost *your* production. Call our nearest office. The Jeffrey Manufacturing Company, Columbus 16, Ohio.



*Roof  
Drilling*

The 56-RDR Roof Drilling Machines average 125 bolts per shift, with some shifts reaching as high as 170 4-ft bolts. The mine has changed from timbering to roof bolting for increased safety.



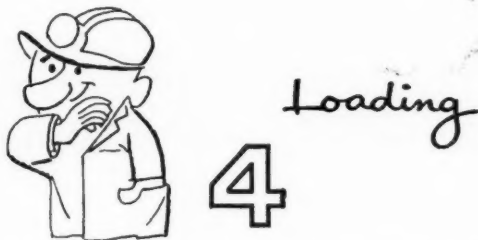
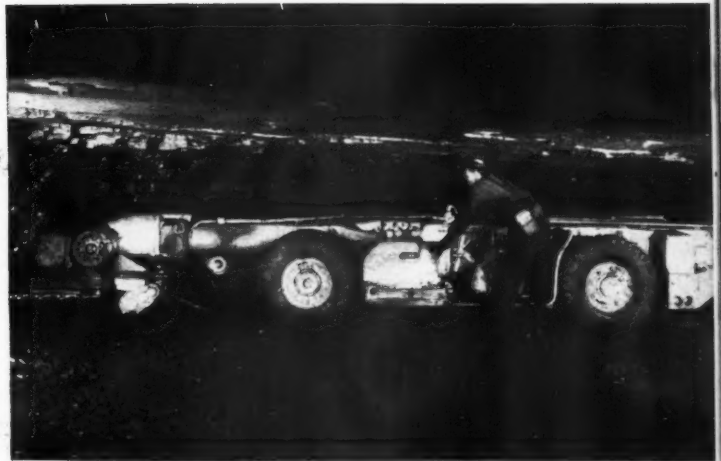
*Face  
Drilling*

The 56-FHR Face Drilling Machines provide excellent flexibility, with heads that can be swung by finger tip control for working anyplace in the face. Drilling range is 7 ft. 2 3/8 in. vertically and 13 ft. 1 3/4 in. horizontally.

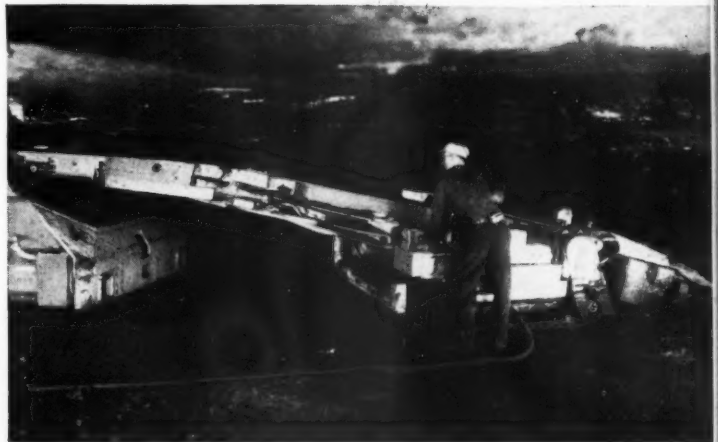
# teams for Fairview



The 70-UR Universal Coal Cutters with bug dusters are doing an outstanding under-cutting job at Fairview. Head and cutter bar can be rotated 360° in either direction for any kind of cut, anyplace in the seam. They can make a 30 ft. horizontal cut (using a 9 ft. cutter bar) or a shearing cut 5 ft. 5 in. to either side of center.



Jeffrey 81-A Loaders tram at 137 FPM and can be turned in their own length. The conveyor swings 45° either side of center and elevates to load shuttle cars on the straight or in break-throughs. They are rated at 8 TPM, with maximum of 10 TPM.




Five of these 66-B Shuttle Cars serve the two mining units at Minnehaha Mine. They make fast trips with big payloads from the face direct to mine cars. Features include 4-wheel drive, 4-wheel steering, 4-wheel brakes, hydraulically driven conveyor and cable reel.



• CONTRACT MANUFACTURING



# JEFFREY



**JOY MANUFACTURING COMPANY** uses Timken bearings in 72 vital spots throughout their heavy-duty 1-CM continuous miner. Timken bearings take radial, thrust loads in all combinations.

## Coal mine production jumps for joy—when TIMKEN® bearings roll up 17,818 tons in a month

USING Joy Manufacturing Company's 1-CM continuous miner, a West Virginia mine—in a regular month of operation—brought up 17,818 tons of raw coal. This was an average shift production of 457 tons, and an average production *per man-shift* of 53.8 tons . . . a 40% increase over conventional methods. Built for heavy-duty operation and high-tonnage production, the Joy 1-CM keeps rolling up record production with Timken® bearings in 72 vital spots: idler head, speed reducer clutch, power take-off, crawler assembly, scroll drive, bar gear case, pump drive reducer, etc.

Tapered construction lets Timken bearings take heavy radial and thrust loads in all combinations. Full line

contact between rollers and races gives extra load-carrying capacity. Rollers and races are case-carburized, with hard, wear-resistant surfaces over tough, shock-resistant cores—take tremendous shock loads. Timken tapered roller bearings make closures more effective by holding shafts concentric with housings. This means dirt, coal dust, water are kept out while lubricant stays in.

*Friction is practically eliminated.* Timken bearings are geometrically designed to give true rolling motion, and precision-made to do exactly that in service. We go one giant step beyond all other American bearing makers in quality control—we make our own steel. Design, precision-manufacture, rigid inspection and control

of quality from melt shop to finished bearing all mean you get the finest when you specify "TIMKEN" on every bearing!

The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



# TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

## TAPERED ROLLER BEARINGS ROLL THE LOAD

OCTOBER, 1956

VOLUME 42 • NUMBER 10

# Mining

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FRONT COVER: Loading drill holes with a liquid-oxygen explosive in strip coal operation—described in A. E. Lamm's article beginning on page 28.

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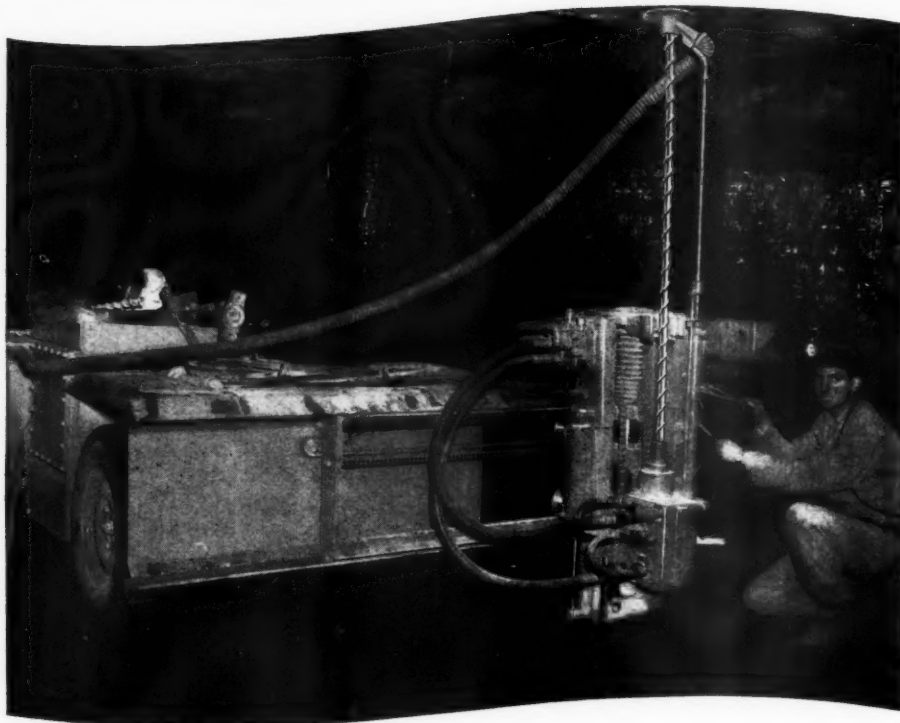
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# **THRUST IS A MUST!**



**... and FLETCHER Roof Control Drills  
deliver nearly TWICE AS MUCH THRUST!**

**F**LETCHER ROOF CONTROL DRILLS have far more thrust to easily penetrate hard roof materials, because they actually drill from the mine floor.

An exclusive hydraulic lowering method sets the entire front-end-feed down before drilling starts — in center position or when extended out by hydro-slide. The jack-feed system used is the simplest, most effective means of providing the power, critical thrust control, and rigidity essential for maximum bit life and penetration rate.

If your roof drilling problem is high bit cost, tough materials, or slow bolt installation rate, you'll want to learn more about the Fletcher Roof Control Drills.


## **FEATURES**

- Jack-feed system delivers maximum smooth thrust with quick raise and return.
- Hydraulic lowering device lets you drill directly from the mine floor.
- Hydro-slide moves your drill across the place smoothly, accurately and fast.
- Compact frame and third-wheel steer makes tramming quick and easy.
- Height range from 28-inches to 14-feet lets you select a drill to exactly fit your mine.
- Telescoping mast gives full stroke in varying seam conditions. And the new floor-to-floor mast gives added safety, speed and power.



**J. H. FLETCHER & CO. I**

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**Does a  
trip of Mine Cars  
ever wear out?**

No! Effectively, a mine car trip *never* wears out. When one car needs repairs, you simply shunt it to a siding in a couple of seconds...and the rest of the cars keep rolling out the tonnage. When you retire a car after a long, hard life, it's just one car, not a major over-haul. One car at a time over the years, a mine car trip is kept young and productive with ordinary maintenance and repair.

And **Q C f** Constant Haulage Mine Car Systems offer additional advantages. *Flexibility:* extending or changing your line is relatively simple when there's only track to move. *Two-way payloads:* men and supplies can ride into your mine in cars that carry the coal out.

Actual cost and production figures, supplied by mine operators, show the many advantages of **Q C f** Constant Haulage Mine Cars. Ask your **Q C f** Representative. Just write, wire, or phone any **Q C f** office.

**AMERICAN CAR AND FOUNDRY DIVISION**

**Q C f** Industries, Incorporated. *Sales Offices:* New York—Chicago—St. Louis—Cleveland—Washington—Philadelphia—Berwick—Huntington—San Francisco. *Plants:* Berwick, Pa.—Huntington, W. Va.

**ac f**

**MINE CARS**  
*for Constant Haulage*

Here's  
the drill  
you need for

**LARGER,  
LOWER-COST  
BLASTHOLES**

*Joy 60-BH Drill in operation in a large Southwest copper mine.*



## the **JOY 60-BH** Super Heavyweight Champion

For high-production open pit mining of copper, as illustrated above, large-diameter blastholes are a *must!* The way to drill those large-diameter holes economically—either in copper ore, or in any other open-pit mining or overburden removal job—is with the Joy 60-BH Super Heavyweight Champion. Here's why: because this Joy rotary drill excels in all three of the features which determine bit penetration:

**ROTATION**—Infinite variation of bit speeds, accurately controlled bit speeds, more power on bit rotation, and constant indication of bit speed and pressure by gauges.

**BIT WEIGHT**—The Joy hydraulic feed, using two 5-foot hydraulic cylinders, is the most efficient and dependable method of applying bit pressure. It is more accurately controlled and less hazardous than other methods.

**CUTTINGS REMOVAL**—Only Joy uses a heavy-duty, industrial-type, water-cooled air compressor to insure more dependable air supply required for efficient rotary-air blast drilling.

Other features include a self-aligning hydraulic automatic chuck, hydraulically raised and lowered derrick, and rod handling device.

The 60-BH, capable of drilling 9" to 12" diameter holes in even the hardest rock formations, is the largest in the outstanding line of Joy Champion "rotary-air blast" drills. Smaller models are the 58-BH Heavyweight for 7½" diameter holes, and the 56-BH Middleweight for 6¼" diameter holes. Let us quote on your requirements. Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

Write for **FREE Bulletin 35-3**

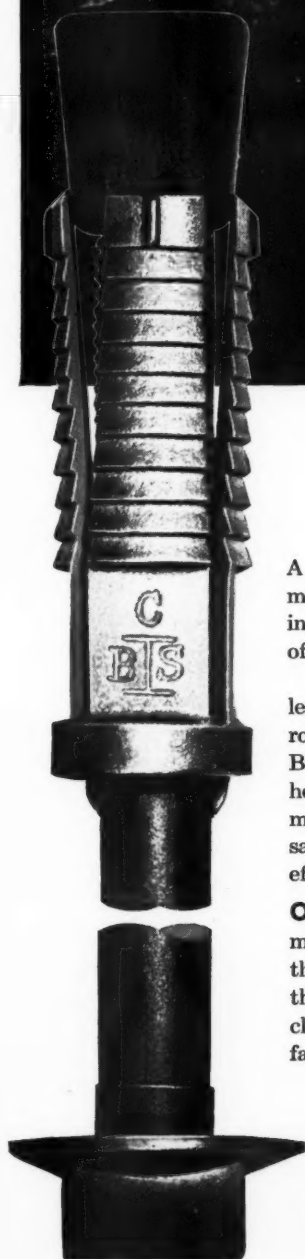


*Consult a Joy Engineer*

**For AIR COMPRESSORS, ROCK DRILLS, CORE DRILLS, HOISTS and SLUSHERS, MINE FANS and BLOWERS**

# JOY

**WORLD'S LARGEST BUILDER OF CORE DRILLS, ROTARY BLAST HOLE DRILLS AND MOTORIZED DRILL RIGS**



## Here's Protection Against Severe Roof Falls

A severe roof fall can mean trouble in more ways than one. It may result in injuries to workmen. It also means loss of production.

But damage from severe roof falls is far less likely when you carry out a modern roof-bolting program, using either the Bethlehem  $\frac{3}{4}$ -in.,  $\frac{5}{8}$ -in. or  $\frac{7}{8}$ -in. square-head roof bolt and expansion shell. This method of roof support makes the mine a safer place in which to work because it effectively anchors the rock.

**Other Advantages** In addition to promoting safety, roof bolting also offers the advantages of increased production through operating mechanical equipment close to the face; improved ventilation; faster transport; less damage to equip-

ment; better housekeeping; no fire hazard.

**How Bolt is Used** A leaf-type malleable iron shell is attached to the Bethlehem square-head bolt before it is placed in the hole. When the bolt is tightened, the leaves of the shell expand to firmly grip the sides of the hole. Additional support is provided by a square roof plate. A hardened washer is used between the bolt head and roof plate to minimize friction.

You'll want to look into the possibilities of a roof-bolting program, using the Bethlehem square-head bolt. Or perhaps you would prefer Bethlehem's slotted wedge-type bolt, also designed for roof support. Either way, you'll find the nearest Bethlehem sales office ready to answer your questions. Why not call them right now?

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation*

# BETHLEHEM MINE ROOF BOLTS

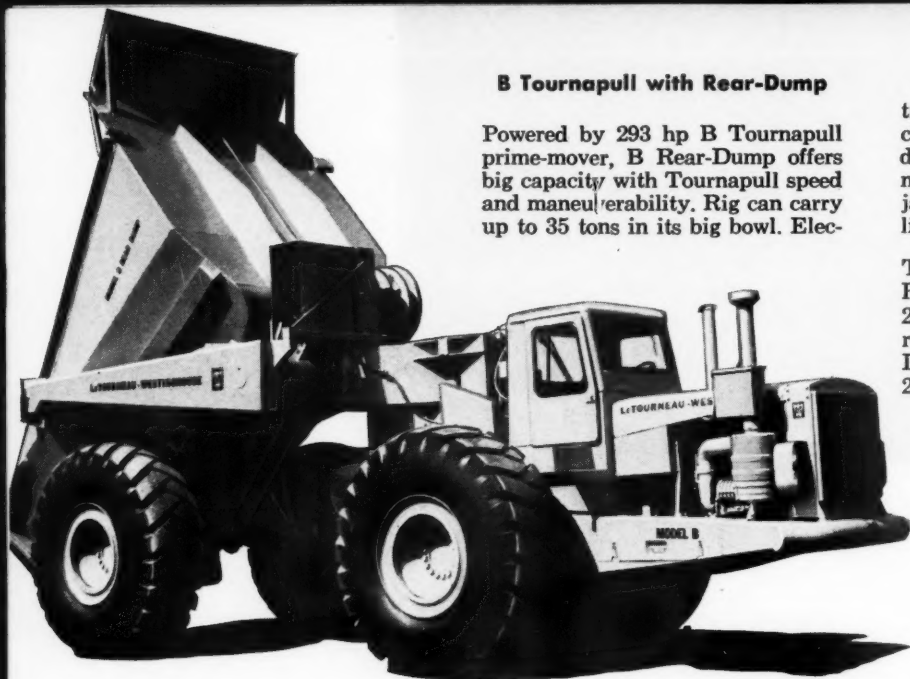


### B Tournapull with Rear-Dump

Powered by 293 hp B Tournapull prime-mover, B Rear-Dump offers big capacity with Tournapull speed and maneuverability. Rig can carry up to 35 tons in its big bowl. Elec-

tric-control bowl dumps fast and clean to clear rear-wheels. Simple dump-and-hoist motor control eliminates troublesome hydraulic pumps, jacks, and jointed pipe-and-hose lines. Dump action is instant.

This 35-ton capacity Model B Rear-Dump, with tires 7' high and 2'2" wide, hauls over pit floors and rough mine roads. Other Rear-Dump models with capacities of 22 and 11 tons are also available.



# You saw these cost-cutting rigs at the Mining Show!

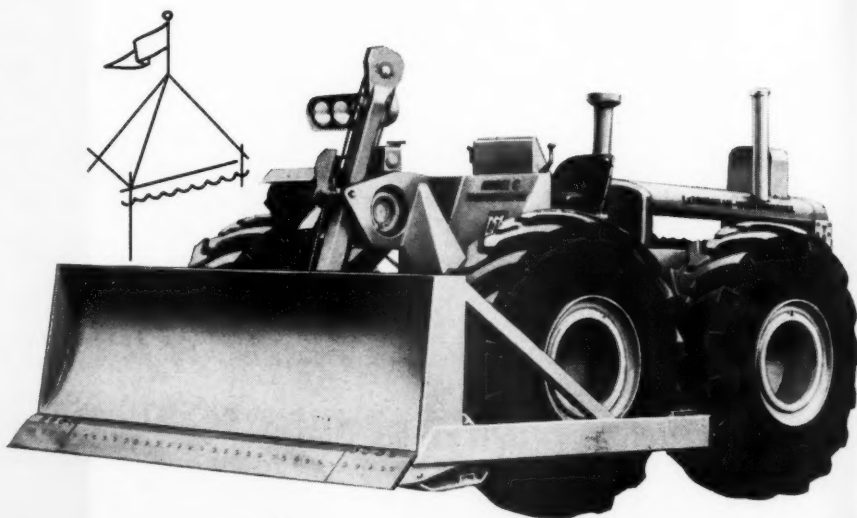
Now that you've seen these heavy-duty work tools at the Los Angeles Show... why not check their profitable features with owners who have proved their abilities? Write or phone, and let us furnish you an owner list on any units that fit your current requirements. You can make your own contacts direct.

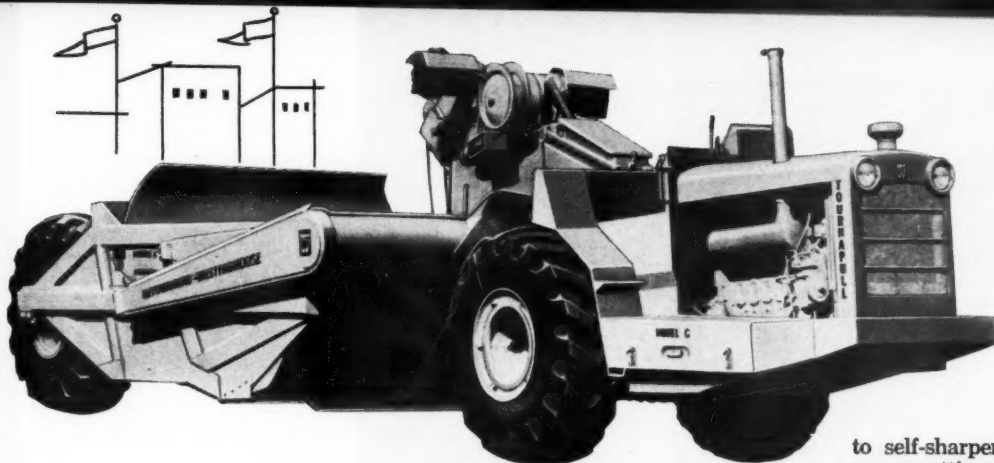
The display at the Mining Congress Show gave you half the story — now let us help you get the rest, by furnishing you with on-the-job contacts in your area.

### C Tournatractor

208 hp Model C Tournatractor with 24,700 lbs. push or pull in 1st gear at 1.5 mph... works and travels on or off roads at speeds to 17 mph forward, 7 mph reverse. Combines power and traction with rubber-tired speed and mobility. Can be equipped with bulldozer or angle-dozer blade, or push-plate. Standard railroad coupler can be attached to rear for switching and car-spotting.

At pit or quarry, Tournatractor dozes overburden, prepares drill sites, cleans up around shovels, and tows heavy equipment. At plant, it levels and grades roads, maintains stockpile and positions rail cars. Fast-moving rig's mobility quickly takes it from one job to another.





### C Tournapull with Fullpak scraper

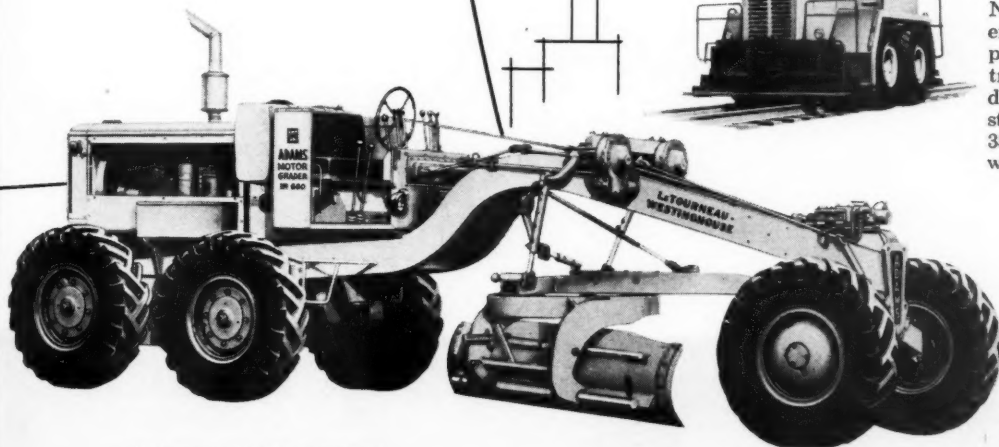
A new improved scraper for the time-tested, 208 hp C Tournapull prime-mover! 18-yd. C Fullpak has a lower, wider bowl...boils better... loads faster...fills corners and heaps big pay-loads. Low push-block delivers direct-line thrust of pusher

to self-sharpening blade for maximum cutting power.

This is the ideal tool for heavy-duty load, haul, and spread work...for stripping or other dirtmoving around your pit. C Tournapull hauls fast on all surfaces...maneuvers in tight quarters. It can be shovel-loaded for straight haul work. Tournapull scrapers are also available in 7½ and 25-yd. heaped capacity sizes, to meet your needs.

### More power — infinite gear ratios

Now available — Adams 660 with "POWER-Flow" torque converter coupled to new 190 hp engine. Lets you handle every grading job at fastest, most efficient rate...instantly adjusts power-speed ratio to load, with infinite speed combinations—for any type of job.



### Adams "660" Grader

Better haul-road maintenance and general clean up can cut your pit costs. And there is no better tool for this important job than the big 150 hp Adams "660". This grader outperforms all others in its weight class because of wide speed selec-

tion — 8 speeds forward to 26 mph (11 with optional "creeper" gears for rocky grading or toughest scarifying jobs) and 4 in reverse, to 13.7 mph, for fast back-up.

Fast, powerful "660" can handle all these vital pit jobs: maintain haul

New, rubber-tired diesel switcher, cuts across tracks, yards, pit floor, by shortest route... travels by highway...straddles tracks to pull or push strings of cars. 208 hp, weight 35,640 lbs., outpulls any steel-wheel locomotive near its class.

roads, clean pit floor, level dumped material, clean washed-out dirt from ore benches, keep drainage open, and clean up quickly after blast. There are 4 other models of Adams graders besides the "660"—all with matching horsepower and weight for their work class.

Tournapull, Tournatractor—Trademark Reg. U.S. Pat. Off.; Fullpak, Adams, SwitchMobile—Trademark G-1200-M-w



**LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS**

A Subsidiary of Westinghouse Air Brake Company

ARBA



See you at the ROAD SHOW • Chicago • January 28-February 2, 1957

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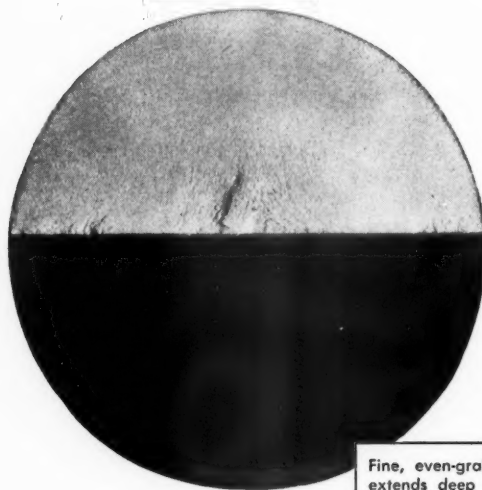
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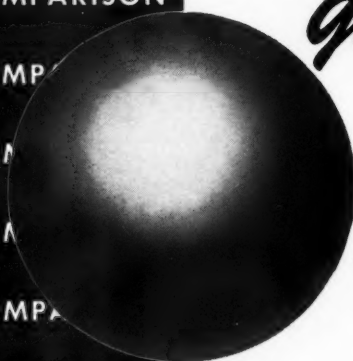
Fine, even-grained structure extends deep into the core of Moly-Cop Ball to give long, even wear.

# STANDARD of COMPARISON FOR OVER 20 YEARS **SHEFFIELD**



**MOLY-COP**  
TRADE MARK  
COPPER-MOLYBDENUM-ALLOY

*Grinding Balls*



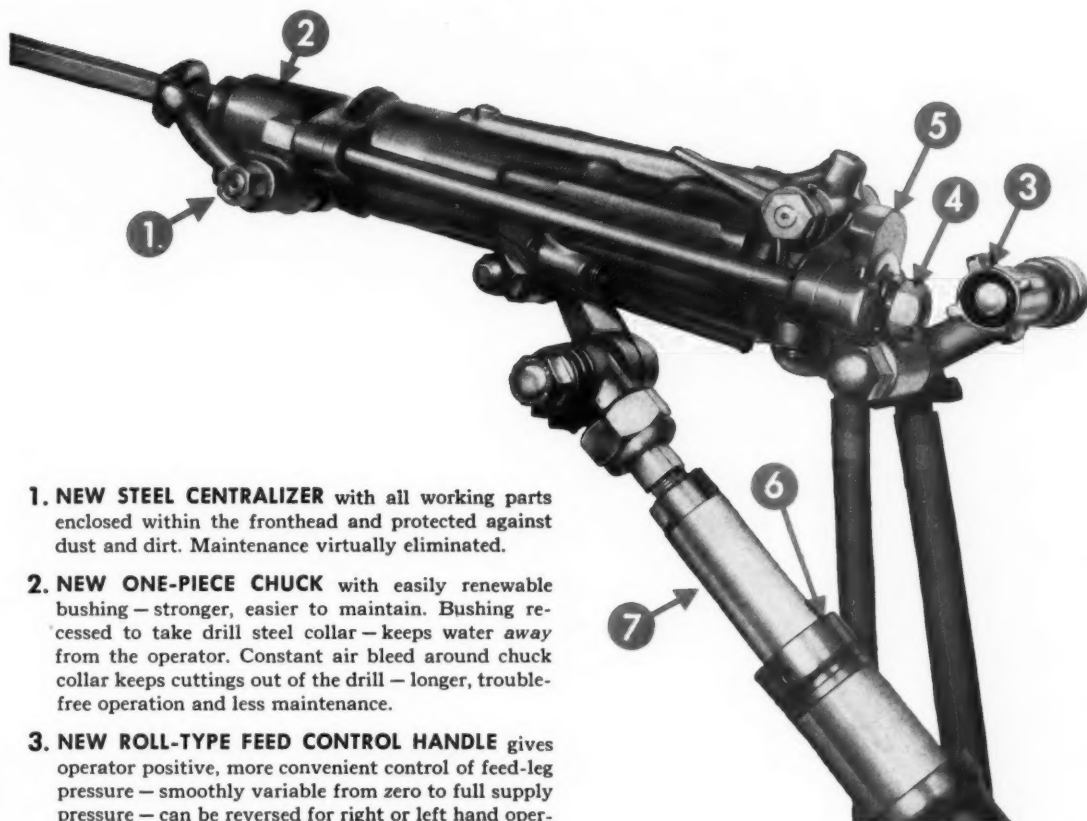
**SHEFFIELD STEEL**  
**DIVISION**

ARMCO STEEL CORPORATION  
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

# new JR-38B JACKDRILL

has **7** improved features

for **EASIER OPERATION & LESS MAINTENANCE**



1. **NEW STEEL CENTRALIZER** with all working parts enclosed within the fronthead and protected against dust and dirt. Maintenance virtually eliminated.
2. **NEW ONE-PIECE CHUCK** with easily renewable bushing — stronger, easier to maintain. Bushing recessed to take drill steel collar — keeps water away from the operator. Constant air bleed around chuck collar keeps cuttings out of the drill — longer, trouble-free operation and less maintenance.
3. **NEW ROLL-TYPE FEED CONTROL HANDLE** gives operator positive, more convenient control of feed-leg pressure — smoothly variable from zero to full supply pressure — can be reversed for right or left hand operation. Push-button valve in end of control knob permits instant relief of feed pressure.
4. **NEW EASY WATER TUBE REPLACEMENT** water tube can be replaced without disassembling the Jackdrill by removing backhead plug.
5. **NEW STOPER CONVERSION** permits Jackdrill backhead to be replaced with a conventional Stopehmer backhead. Simplifies parts inventory and maintenance wherever Jackdrills and Stopehamers are used on the same job.
6. **NEW EASIER DISMANTLING** of feed leg — saves maintenance down-time.
7. **NEW TELESCOPIC FEED LEG** is 10 pounds lighter in weight than previous design — makes Jackdrill easier to handle and transport.

**W**ITH these new features, the I-R Universal Jackdrill is now better than ever — setting new standards of ease and economy — *it will stay underground*. It's not just a Jackhamer-Jackleg combination, but a completely integrated Jackleg Drill, with single air hose connection and all operating controls centralized on the drill backhead. Ask your Ingersoll-Rand representative for complete information on the time-saving, cost-saving features of the new and improved JR-38B Jackdrill.

5-409

## Ingersoll-Rand

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It's time to compare...with **LINK-BELT SPEEDER**



Link-Belt Speeder gives you up to

**40% more usable horsepower**

greater line pull . . . bonus power to dig, hoist, swing, travel

**Link-Belt Speeder machines are built to take full advantage of the "bonus" horsepower available in shovel-crane engines!**



**S**IZE for size, a Link-Belt Speeder gives you more *usable* horsepower. You get more line pull, more power at the bucket teeth . . . more power to swing, hoist and travel. That's because a Link-Belt Speeder takes more power out of its engine!

You see, a Link-Belt Speeder is built with extra strength—strength to handle greater horsepower. Thus, the engine in a Link-Belt Speeder can be (and is) set to deliver the greater horsepower for which the machine is designed. Link-Belt Speeder

gives you a bonus of up to 40% *more usable horsepower* than machines using the same make and model engine! And, in every instance, the engine in a Link-Belt Speeder is run at speeds well within the manufacturer's recommendations.

#### **How to compare**

Your Link-Belt Speeder distributor will furnish complete specification information. Check sizes and materials in Link-Belt Speeder shovel-cranes that allow you to use the actual horsepower you are paying for. LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

14-245

### **LINK-BELT SPEEDER**

*Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls*

Pennsylvania Mine Reports...

## Long Piggyback System helps boost average tons per face man by 250%



The LONG Mobile Conveyor Drive permits moving the conveyor head, pictured above discharging coal into a LONG Gathering Conveyor, from one location to another under its own power.

The Piggyback Conveyor, shown at right, provides continuous transportation from the face to the outside because it eliminates lost time for car changes.



At this Pennsylvania mine, LONG Piggyback\* and Mobile Room Conveyors are being used to service two continuous mining machines in a seam that varies from 34-inch to 42-inch in height. Average production has been boosted 250% per face man per shift, and face advance has been stepped up from 5 to 90 feet per shift.

In commenting on his company's experience with the Piggyback Conveyor System, Mr. Charles Richardson, superintendent at this mine, says, "Our LONG equipment has practically eliminated spillage and supplies an uninterrupted, steady stream of coal to the processing plant. We feel that this continuous

haulage system, in combination with efficient overall planning, and the use of continuous mining machines, has been largely responsible for helping us change this operation from a non-profitable one to the point where it is making money."

Results like this are typical with low-investment, low-maintenance Piggyback Mining—whether used with conventional loaders or with continuous mining machines. In case after case, this unique system has meant far more tons per man, much lower operating costs, and greatly increased profits. We'll be glad to supply facts and figures.

\*Trade Mark

For complete details or a demonstration, write...

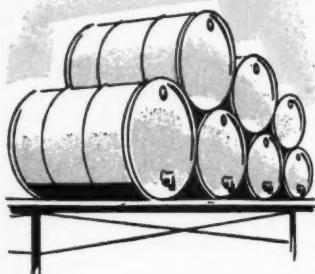
*The*

**LONG**

OAK HILL, W. VA.

*Company*

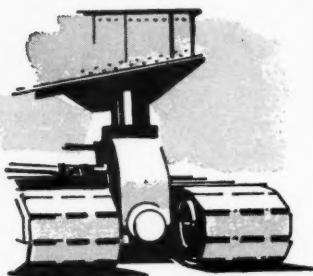
*How to cut  
mining  
maintenance  
costs*



**1** Reduce oil inventories

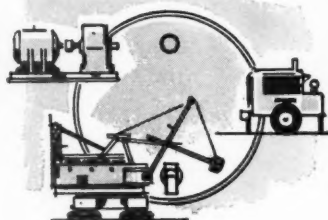
STANOIL Industrial Oil can be used in so many places that you can reduce inventories of special oils. Add to this the economy of simplified storage and handling. Use STANOIL Industrial Oil in electric motors, air compressors, fans, blowers, transmission and clutch lubrication, and hydraulic systems. Use STANOIL to lubricate bearings either in direct application or in oil circulating systems.

**Use STANOIL Industrial Oil—  
save these three ways**



**2** Get better lubrication

Special solvent-refining techniques plus the blending in of exclusive additives make STANOIL the finest industrial oil. STANOIL resists chemical change . . . lubricates effectively and completely over a wide temperature range . . . cuts wear. It protects oil systems from troubles due to carbon deposits, corrosion and emulsion. It stands up under heavy and repeated shock loads. STANOIL has high oxidation stability and extremely low carbon forming tendency.



**3** Prevent application mistakes

When there is only one lubricant, there can't be any chance of the wrong one being used. With STANOIL, errors in application that would result in breakdowns are eliminated; equipment stays in service longer; maintenance is easier; overhauls go more smoothly and equipment is back in service faster.

Get more information about STANOIL Industrial Oil.  
Call your Standard Oil industrial lubrication specialist.

He is experienced in mine lubrication. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

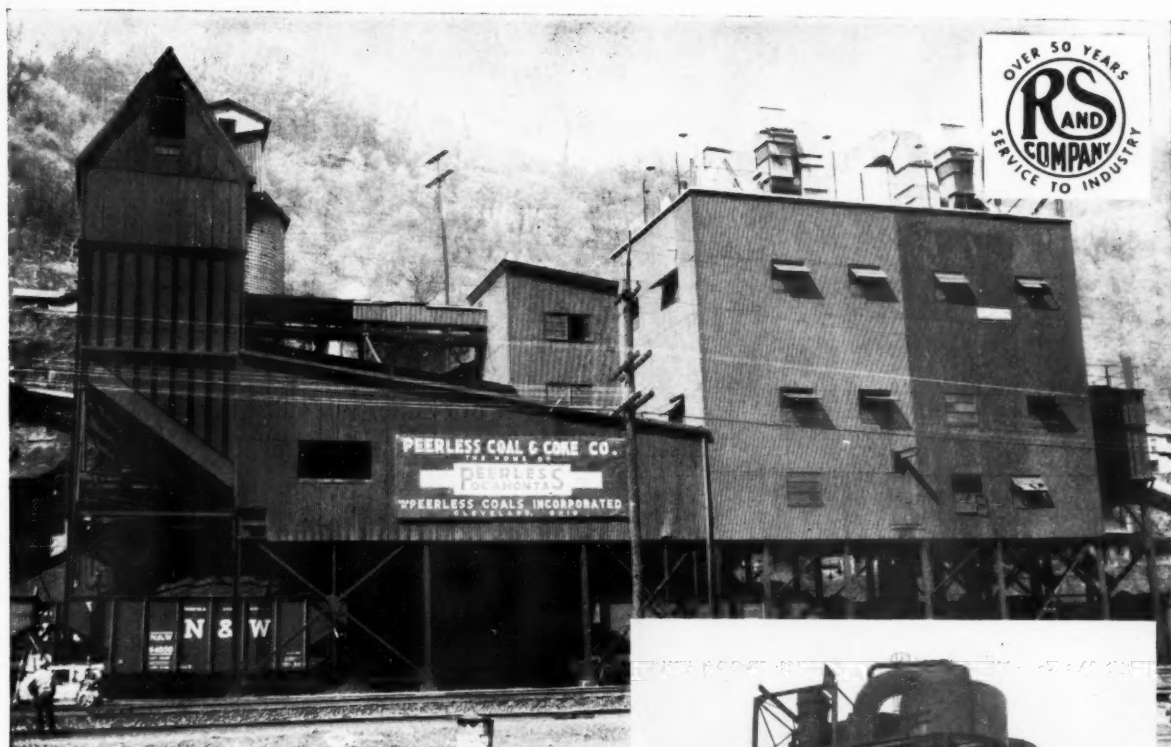


**STANDARD OIL COMPANY**  
(Indiana)

**Quick Facts About**

**STANOIL Industrial Oil**

- **Stability**—STANOIL's antioxidant gives oil resistance to chemical change, minimizes deposits.
- **Cold Starts**—STANOIL has low pour point. Flows freely from cold start. No need for costly warm-ups.
- **Rust Prevention**—The inhibitor in STANOIL "plates out" on metal surfaces, prevents corrosion.
- **Resists Effects of Temperature Change**—STANOIL has high viscosity index, resists temperature change.
- **Has Excellent Demulsibility**—STANOIL is refined to eliminate emulsion problems, contains additive to minimize foaming.



now in operation...

## 2 MORE

**Modern Coal Preparation Plants**  
designed and built by  
**Roberts and Schaefer Company**

**M**OUNTING sales and production have necessitated repeated additions to the Peerless Coal & Coke Co. plant at Vivian, West Virginia, illustrated above. Designed and built originally with R&S equipment, the first addition at far right incorporated R&S air washing to remove the fine size impurities produced by modern mechanized mining methods. So satisfactory has been this installation that the most recent addition also contains additional air washing facilities.

Similarly, in the modern plant of the Crozer Coal and Land Co., Dott, West Virginia, the new addition, illustrated at lower right, also employs R&S Super-Airflow equipment with equally satisfactory results.

Although both these well-known companies—and many others—have found R&S Super-Airflow cleaning to be the most satisfactory for their conditions, R&S has also designed and installed other



washing processes. Your confidence in R&S engineering integrity is justified. Knowledge and experience in designing and erecting these different types of coal preparation plants in all coal producing regions of the country enable our engineers to select for you the method that exactly meets your need and gives the most satisfactory, most economical results.

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Subsidiary of Thompson-Starrett Company, Inc.  
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Bits of Crucible Silicon-Manganese alloy steel shown in holder. They are produced by McLaughlin Manufacturing Co., Inc., Joliet, Illinois.



Operator is shown feeding 7-foot strips of steel into punch press. Crucible furnishes this steel in a special shape designed by McLaughlin engineers. After forming to finished size, the bits are heat treated and the point and cutting edge are sharpened by hand.



*special*  
**CRUCIBLE**  
*alloy*  
*steel*

**gives bits maximum impact and abrasion resistance . . .**

Cutting through abrasive materials like coal, soft limestone and shale demands a *special* steel. A steel that's hard without being brittle — that will take and *hold* a keen edge.

That's why Crucible produces a *special* Silicon-Manganese type alloy steel for the McLaughlin Manufacturing Co., Inc., manufacturers of these bits. It's a steel designed for optimum shock and abrasion resistance.

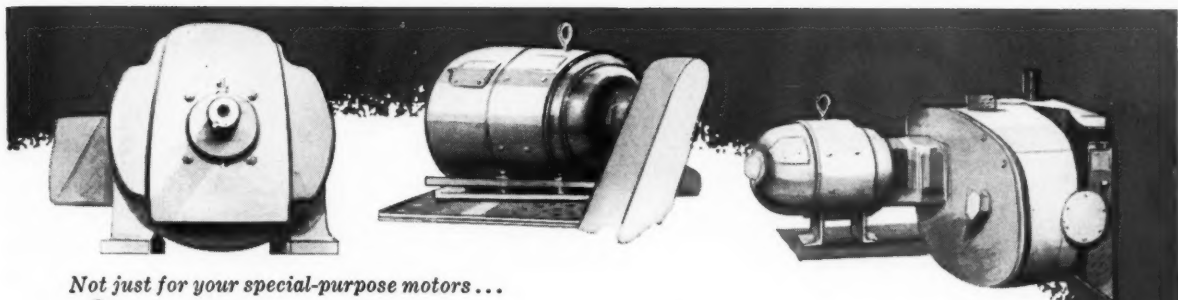
After McLaughlin tested Crucible's special alloy in the coal fields, their verdict was "This Silicon-Manganese steel is the finest alloy steel available."

Crucible will be glad to produce a *special* steel to meet your particular needs, too. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

**CRUCIBLE**

first name in special purpose steels

**Crucible Steel Company of America**

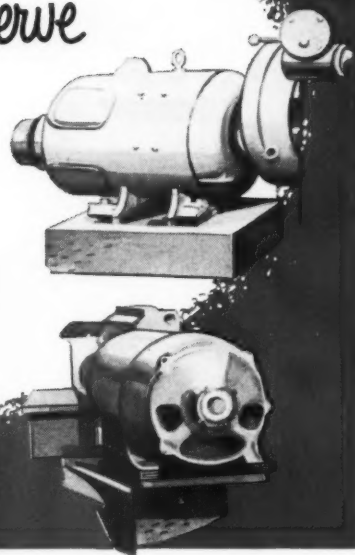
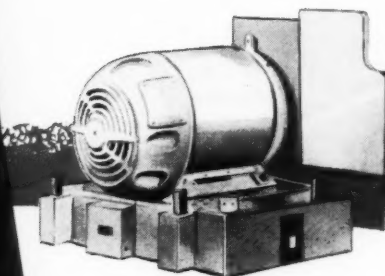


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*For regular duty* a handsome choice  
of grades with proven dependability...

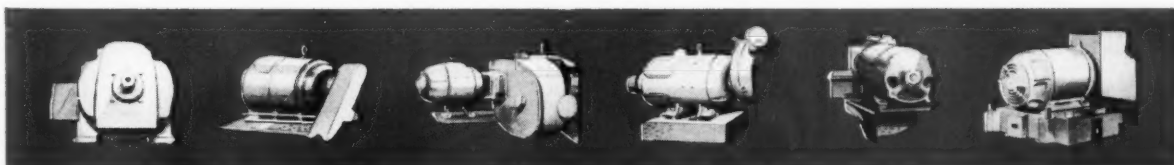
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## A message from a good-looking haulageway

There is far more to a good-looking layout than just appearance. Truly good-looking track carries an important message, which perhaps might run like this:

"I am rugged and strong, fully able to carry the load today, and in the heavier-tonnage days ahead. If I really do look good to my owners it's because I constantly remind them that I carry heavier trips at higher speeds without spillage or costly derailments. In other words, they look at me and forget the money I cost, because of the savings I earn."

"I was made from quality rail steel produced by Bethlehem. I was designed by experienced Bethlehem engineers who really know mining, who thoroughly studied the job I was supposed to do."

"I was carefully assembled on Bethlehem layout floors according to a predetermined plan, to be sure

final installation would go along smoothly. All parts were checked for proper fit, all curves for proper radii, before a single item was shipped."

"By the time I arrived at the mine, all bugs had been ironed out, all chance of wastage virtually eliminated. Small wonder I look good to my owners, and will for a long, long time to come!"

Fanciful, yes! But the message is there to be heard by any mine that is looking to a profitable future. A Bethlehem engineer will be glad to fill you in on the details; you can reach him through any Bethlehem office, or by writing direct to us.

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The right heft and a sharp point always. Points of highest quality heat-treated tool steel are set in tapered sockets, easy to renew when worn. Heads made from special steel, properly designed for weight and balance.

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Model EB-36

Economy and efficiency are combined to make C·M·I Centrifugal Dryers leaders in their field. The unprecedented basket design of this dryer provides greater capacity together with economy of operation. The coal is dried to a 6% surface moisture content without the use of expensive heat-drying operations. Increased resistance to shock loads is provided by the new V-belt direct drive, while clogging, and resulting clean-

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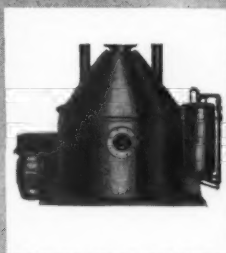
The new C·M·I dryer provides savings in daily operation expense in addition to low installation costs. For only a few cents a ton, this dryer will actually earn extra profits for you through the reclamation of marketable coal from slurry ponds. C·M·I welcomes the opportunity to assist you with your particular problems in this field.

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Model EB-36 is compact, requires little space, little headroom.



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## Reinsulate with U. S. Uskorona and "D. R." Tapes

A cable becomes as good as new when you reinsulate with Uskorona and re-jacket with "D.R." splicing compound. The "D.R." compound provides an outside vulcanized covering. These completely reliable tapes give:

- Extra-tight grip plus high tensile strength.
- They stand up under acid, alkalis and moisture... ideal for mining machine cables.
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- Absolutely waterproof.

Like all the tapes and splicing compounds in United States Rubber Company's complete line, Uskorona was developed for specific operating conditions, yet can handle a wide range of electrical and general purpose jobs. It exceeds A.S.T.M. specifications.

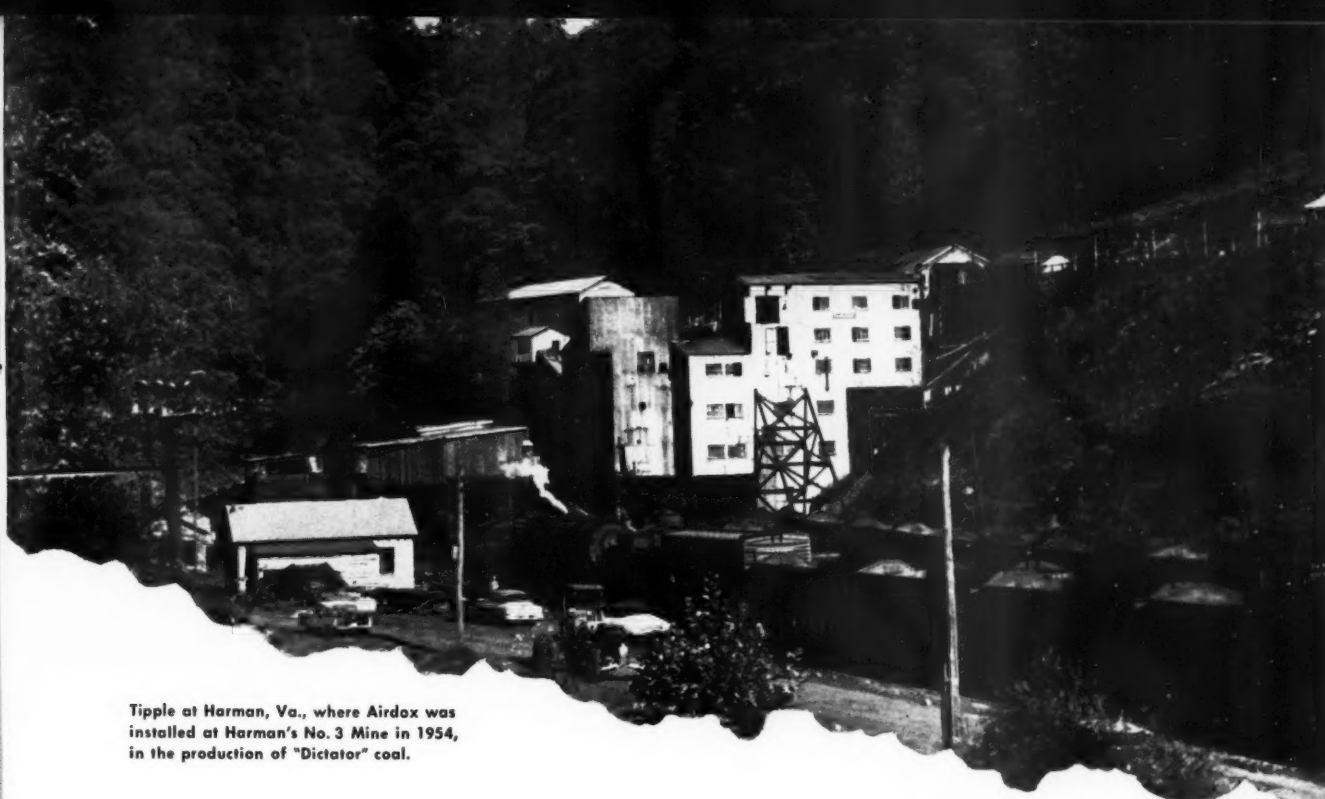
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Mechanical Goods Division

# United States Rubber

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Tipple at Harman, Va., where Airdox was installed at Harman's No. 3 Mine in 1954, in the production of "Dictator" coal.

**"consistently better results**

with **AIRDOX**"

NON-EXPLOSIVE MINING METHOD

**AIRDOX**

NON-EXPLOSIVE MINING METHOD

**Cuts Costs 5 Ways**

- Produces less fines in face preparation
- Rolls coal forward for faster, easier loading
- Easier on "tender" roofs—cuts timbering, bolting
- Lowers cleaning costs by minimizing fines
- Reduces degradation—no shattered coal



says I. J. RICHARDSON,  
President,  
Harman Mining Corporation

"Cardox Corporation installed their Airdox System in our No. 3 mine in 1954. We find that we are getting consistently better results with Airdox, inasmuch as the coal produced from this mine contains a larger percentage of coarse coal and the loadability is much better when loaded mechanically. Airdox is economical, too, on a cost-per-ton basis.

"The management of this mine is well pleased with the performance of Airdox and results obtained."

**CARDOX CORPORATION • 307 NORTH MICHIGAN AVENUE • CHICAGO 1, ILLINOIS**

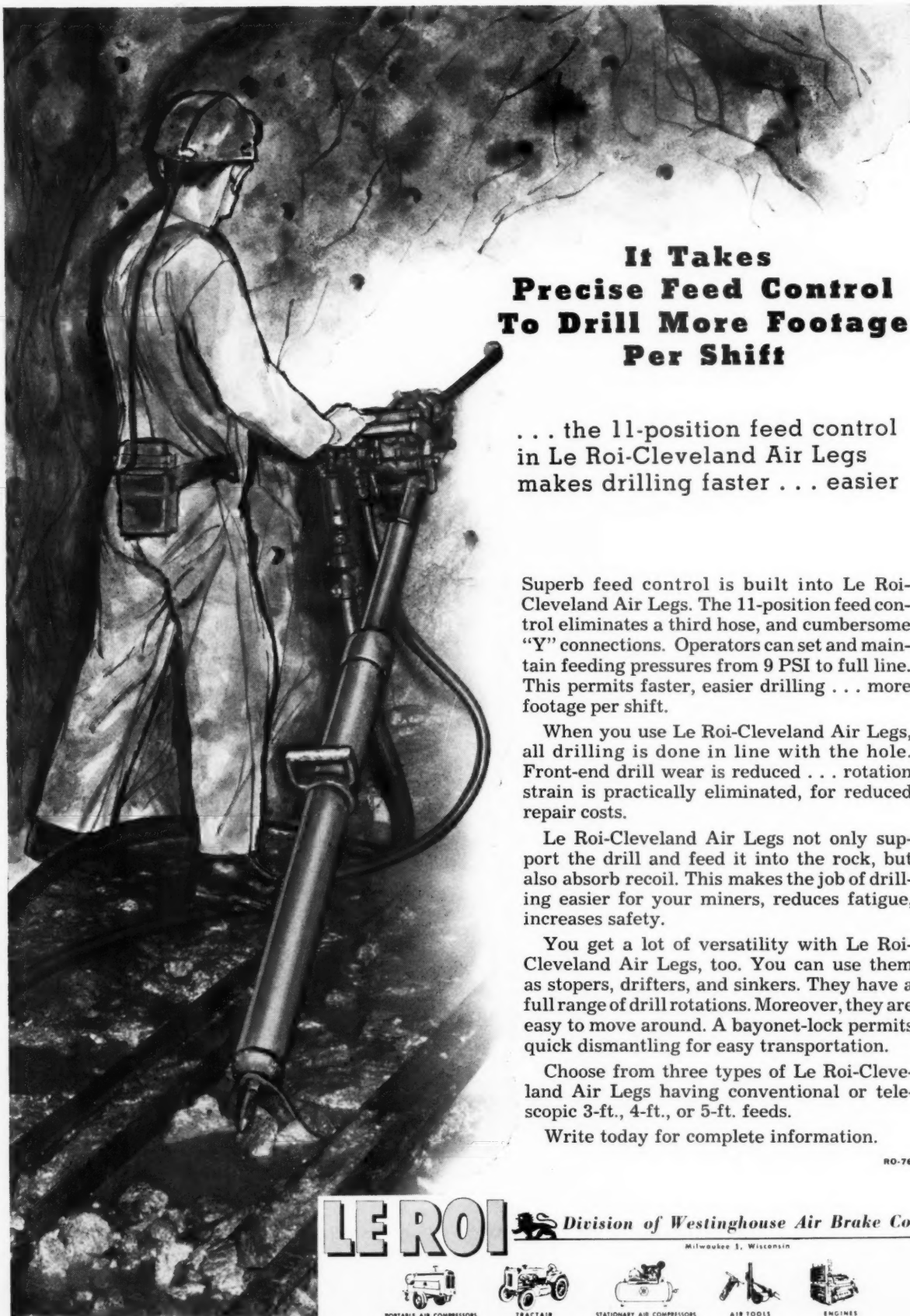
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... the 11-position feed control in Le Roi-Cleveland Air Legs makes drilling faster ... easier

Superb feed control is built into Le Roi-Cleveland Air Legs. The 11-position feed control eliminates a third hose, and cumbersome "Y" connections. Operators can set and maintain feeding pressures from 9 PSI to full line. This permits faster, easier drilling ... more footage per shift.

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Le Roi-Cleveland Air Legs not only support the drill and feed it into the rock, but also absorb recoil. This makes the job of drilling easier for your miners, reduces fatigue, increases safety.

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Choose from three types of Le Roi-Cleveland Air Legs having conventional or telescopic 3-ft., 4-ft., or 5-ft. feeds.

Write today for complete information.

RO-76

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Division of Westinghouse Air Brake Co.

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**Mining**  
CONGRESS JOURNAL

*Published for the Entire Mining Industry*  
by the AMERICAN MINING CONGRESS

ROBERT W. VAN EVERA, Editor

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Volume 42
OCTOBER, 1956
Number 10

## Into High Gear

WHAT has been evident to men close to the coal industry for some time, is finally accepted as fact by American business as a whole—that coal is assured a stable future as the primary source of industrial energy for many years ahead. It is economical and it is abundant.

The fast growing electric utilities, coal's largest single customer, have collectively shown an unbroken record of production growth since 1938. Each month since that year has seen greater electrical energy output by the utilities than the corresponding month of the year before. This year electric power consumers will have purchased more than double the amount produced in 1949.

The coal industry is the largest single supplier of fuel for electric power generation. For the first half of this year coal furnished 72 percent of the utilities' thermal energy needs, as compared with 69 percent for the same period last year. Over 90 percent of the added fuel market caused by increased electrical energy production was supplied by coal.

Nuclear energy is considered by many as a possible "dark horse" contender for fuel markets in the future. Indeed, it is evident from the great expenditures in research and development in the atomic reactor field, by some of our strongest business enterprises, that the day will come when the atom will account for a sizable share of the world's energy production; and because of its "freightless" characteristic, it will bring power to areas located remote from economic coal supplies. Overall, however, the outlook for energy requirements in the long-range future is that they will be so staggering that fossil fuels may be hard put to keep up with new energy-consuming developments, and that nuclear power will supplement rather than supplant present energy sources.

How has the revived coal industry arrived at its present strong position? It hasn't "just happened."

First, coal has virtually lifted itself by its own bootstraps by mechanizing its mining operations. This development was without precedent—no other industry had conditions similar enough to serve as a pattern, and seldom was it possible to adapt machines from other industries to coal's needs. The industry accomplished this modernization from scratch, and it is going on today at a faster rate than ever. Bold decisions and sound engineering and research have been and will continue to be a "must."

Second, coal companies have equipped themselves to do a complete managing job. The problems of market analysis and promotion have received concentrated attention—with the result that new enterprises are moving into coal areas and basing their energy requirements on coal. Through sound mergers coal companies have integrated their activities, achieving more efficient operation and helping to stabilize the industry. Public relations have been greatly improved, in the effort to present the true picture of the coal mining industry to the American people. Research in new production and preparation methods as well as utilization potentials have paid off well and hold great promise for the future.

Third, coal has transformed itself from an industry beset with unfavorable labor relations to one with labor peace. This has been done in an industry with thousands of producers where no one company produces more than a small part of the total output.

Attesting to the sound present status of the coal mining business we see \$10,000,000 spent on a coal pipeline by Pittsburgh Consolidation Coal Co. Peabody Coal Co. has ordered several huge stripping shovels with up to 70-cu yd bucket capacity—each costing millions of dollars. Aluminum producers are building multi-million dollar reduction plants in the Ohio River Valley to take advantage of coal supplies. The building of million-dollar preparation plants no longer incites comment. Leading investors in financial circles recognize the stability of coal—as well they must to make the above expenditures possible. Such are the accomplishments of competitive private enterprise.

## Tax Realism

IN THESE days of "big" Government a big tax bill is inevitable. The cost of past, present and future Government obligations is high and may remain so for a long time to come. Mining wishes to meet its fair share of this heavy burden. It can best do so by being a vigorous and productive industry. We agree with Senator Clinton P. Anderson of New Mexico who, earlier this month in an address at our Convention in Los Angeles, stated, "Production of minerals creates new wealth and thus new sources of revenue. It makes sense then that we write tax laws that will encourage mineral production."

In his address the Senator outlined a tax program that would help do just that. He called for: adequate depletion allowances, removal of the limitations on deductibility of exploration expenditures, tax exemption for new mines for a period of three years, a reduction in tax rates in order to help the miner put away some of his earnings in the profitable years to tide him over the lean years, and taxation of capital gains at more moderate rates. He asked Congress to give appropriate consideration to his suggestions.

Such a realistic tax program would remove many of the roadblocks that kill off incentives to search for and develop new mineral wealth. Besides creating new revenue sources, this program would help build a strong and expanding mining industry—vitally needed to furnish the raw materials for an adequate mobilization base and an ever-growing industrial economy.



The above picture illustrates shooting at Fidelity Pit, The United Electric Coal Companies. Many new developments have occurred in strip mine blasting over the last few years

## Recent Developments in Drilling and Blasting Overburden

**A summary of the work that has been and is being done by mine operators and machinery and explosives manufacturers to produce lower cost and more efficient drills and explosives for strip mining**

**By A. E. LAMM**

Executive Vice-President  
Sunnyhill Coal Co.

MOST of us who had any appreciable amount of rock to drill and shoot 25 years ago were using small churn drills and were getting about 100 ft per shift. Larger churn drills raised this to 150 ft per shift and later drills brought this up to about 200 ft. However, this seemed about the optimum that could be obtained with any drill depending solely on a falling weight. The principal of the churn drill was used by the ancient Egyptians and about all that was accomplished in 4000 years with this method was to

apply internal combustion or electric power for raising the string of tools and to improve the shape and metallurgy of the drill tools.

### Turn to Rotary Drilling

The petroleum industry has been using automatic rotary drilling for 35 or 40 years, but it took our industry a good while to take advantage of the much greater drilling speeds which this method offers. Of course, the principal problems were to make such a unit mobile enough to move rapidly

from hole to hole and to provide the large amount of water needed for this type of drilling.

Fortunately, after we once got started, these problems were rather quickly solved by substituting air for water and by mounting the larger size rotaries on wide "cats" and the smaller rotaries on heavy trucks. Drilling speeds are now about four to eight times what they were with churn drills and it is not uncommon to find some bituminous mines drilling more than 1000 ft per shift. There has been also a considerable trend toward larger holes on greater spacing which has materially reduced the number of holes to be drilled. Of all of the large drills sold by one manufacturer, 97 percent are drilling holes larger than nine in. and two-thirds of these are drilling holes larger than ten in.

### Sizes Range Up to 12¼ In.

The principal manufacturers of large rotary drills for the bituminous and anthracite industries are Bucyrus-Erie Co., Joy Manufacturing Co. and Reich Brothers. Bucyrus-Erie makes the 50R, which is used largely for

drilling holes up to 12¼ in., and 40R, used for holes up to nine in. Joy, one of the first in the field, has a line of nine-in. drills which they have manufactured for several years and they have recently developed a new larger and heavier drill known as the 60BH Super Heavyweight Champion which will drill holes up to 12¼ in. Reich Brothers of Terre Haute manufactures a line of truck-mounted drills used largely for holes up to 7½ in. Other truck-mounted drills are manufactured by Varel, Joy, Mayhew, Failing, among others.

Reich Brothers have a new crawler-mounted rotary drill under development which is very mobile and will help solve some of the problems of operators who must travel drills considerable distances over rugged terrain. This unit has an infinitely variable hydraulic pump turning the rotary head which will allow infinite drilling speeds to meet varying conditions.

F. F. Kolbe, president of the United Electric Coal Companies, in connection with Reich Brothers, developed a large rotary drill which is unique in that the mast is in excess of 90 ft high and, with this drill, it is unnecessary to add tools for most overburden conditions. The drill stem of this tool is an auger and, although the hole is cleared by air, the auger assists in bringing the cuttings from the hole.

### Problem of Holes Squeezing

At some mines, difficulty has occurred in the use of a rotary drill due to the portion of the hole through soil or clay having a tendency to squeeze. To avoid this, holes are being loaded immediately after they are drilled. This results in having to hold up the drill so that the loading may be synchronized with the drilling. In some cases, holes are being shaved with a circular knife on a long rod in order to load them.

At Southwestern Illinois Coal Corp., this has been overcome by augering through the clay and then changing to the roller bit. Although this necessitates two extra tool changes, consuming about three minutes each, the faster drilling through the clay with the auger and the saving of time and trouble as the result of the hole not squeezing more than makes up for the time lost in changing tools. This results in a saving of bit costs at this operation of almost \$8000 per year, or 2½¢ per ft.

At United Electric's Fidelity Mine, considerable saving in drilling and blasting costs has been effected as a by-product of the use of the Kolbe Wheel Excavator. At this operation, the unconsolidated material is removed by the wheel excavator and all of the drilling is now done on the resultant bench. This shortens up all the holes 30 to 40 percent, eliminates

the problem of holes squeezing, eliminates casing holes containing sand, and reduces bit costs by not having to drill through clay. Blasting costs have decreased and better fragmentation secured as the result of discontinuing shooting against a buffer and shooting to the open face. Total yardages have improved as a portion of the material has been moved across the pit by the blasting.

Other projected new developments on rotary drills will provide for a better cab enclosure for the operators' protection in winter, the redesign of the derrick providing for quick lowering where frequent moves under overhead wires are necessary, and the replacement of the roto clone with water injection for settling the dust when the rock dust is abrasive and dangerous. This is done by using a small water pump of 10 to 12 gallons per hour and injecting the water directly into the air as it lifts the cuttings from the hole.

In vertical auger drilling, V. J. McCarthy has developed a very rugged drill capable of drilling a nine-in. hole in coarse grained sandrock to depths of over 100 ft. This drill has a four

drilling materials too hard to drill with augers. Joy Manufacturing Co. has now developed such a drill, the 39SB Horizontal Blast Hole Drill. The successful application of rotary horizontal blast-hole drilling is complicated because: (1) The rate of penetration of rock by rotary drilling is proportional to the weight on the bit. In horizontal drilling, the weight on the bit is proportional to the limited friction between the drill and the earth, unless complicated spragging or anchoring devices are used. (2) Length is limited when a drill is placed perpendicular to the highwall since clearance must be provided behind the drill for passage of other mobile equipment. (3) The height from the ground that can be drilled in the rock is limited in proportion to the center of gravity of the drill.

Field trial of the original design of the Joy 39SB brought about the following changes: installation of heavy-duty, conveyor-type rod handling device; substitution of heavier traction motors, worm gears, and greater reduction; and addition of a hydraulically supported rod guide.

The above described machine, with



Blasting costs have decreased and better fragmentation secured at this mine as the result of discontinuing shooting against a buffer and shooting to the open face

speed transmission allowing slower speeds for harder rock conditions. Where conditions allow the use of an auger such as this, we have been able to drill over 600 ft per shift with this machine.

### Need for Horizontal Drill Using Rotary Bits

Horizontal blast-hole drilling in coal stripping operations has certain advantages because: (1) The charge can be placed entirely in the rock. Unnecessary drilling of easily movable overburden is avoided. (2) The drilling equipment can be concentrated on the relatively hard coal bed. Requirements for grading, dressing or dozing the overburden are minimized.

There has also been a long need for a horizontal drill using rotary bits for

revisions, went into service and gave a pretty good account of itself. Improved methods were conceived and tested. It soon became evident that the usefulness of the machine could be greatly improved by revising the main drill frames and mountings to minimize the relative motion between sections required for drill flexibility; eliminating the need for back-up spragging except in unusual situations; using unflighted rod except for a nine-ft section behind the bit; and eliminating the need for breaking the string and adding rod.

This latter change is difficult. It will be achieved by utilizing a hydraulic chuck at the front end of the drill drive to grip the rod for rotation and for feed. The rod will be maintained in one element long enough to drill 50 ft. It will be fed through



United Electric Coal Companies has been using Unamite, an explosive developed by F. F. Kolbe, company president, exclusively at all of its mines since August 1955 and is enthusiastic about the results

the drill drive and hydraulic chuck and will be suspended at the back end by a horizontal derrick that can be retracted (raised vertically) to permit mobility, and to clear the rear of the drill for the passage of other equipment. The redesigned unit is expected to be in operation soon.

Vince McCarthy has also developed a unique horizontal drill which will soon be put on the market by Salem Tool Co. These new horizontals promise to solve some of the problems involved where hard rock is found close to the coal.

### New Developments in Blasting

Revolutionary new developments have occurred in strip mine blasting over the last few years. Papers on the use of Akremite were presented at the 1955 Coal Show in Cleveland, so we will not go into detail with regard to its use. The development of this explosive has been a great boon to the industry, not only because of its cost advantage, where it has the proper application, but it has stimulated the explosive and strip mine industries toward the development of other low cost explosives.

Lower drilling and shooting costs have been an absolute must to many of us who have found it necessary to go into higher overburden to prolong the life of our mines. They have also been a necessary corollary to the development of the new larger light-weight dippers that many of us are now using on our stripping shovels. As James Morgan, president of Ayrshire Collieries Corp., so aptly puts it, "Our dippers have ceased to be digging tools and are now bailers and transporters of the material." To attain the large yardages necessary to justify the investment in these new dippers has meant that we absolutely had to prepare the bank in such a fashion that the shovels can operate at maximum efficiency.

Most of the explosives manufacturers are now producing Akremite or a

similar type of explosive containing commercial grade ammonium nitrate and coal dust. Hercules Powder Co. has developed such a product which is known as Nitro-Carbo-Nitrate. The principal difference between it and Akremite is that it contains technical grade ammonium nitrate instead of commercial grade ammonium nitrate. It is not cap-sensitive and it is necessary to use a primer with this explosive. It can be secured in polyethylene bags and will soon be available in glassine lined expandable bags.

Working independently, F. F. Kolbe, president of United Electric Coal Companies, and Hercules Powder Co. developed two explosives which turned out to be pretty much the same thing. Mr. Kolbe called his Unamite and Hercules called its Methanite. United Electric has been using Unamite exclusively at all of its mines since August of 1955 and is extremely enthusiastic about the results. Hercules has a patent on Methanite and has been shooting this recently at several Ohio strip mines. While there may be slight variations in the compounding of these explosives, they consist essentially of the following:

- 90% technical grade ammonium nitrate
- 5% coal dust
- 5% Nitromethane

Nitromethane, a hydrocarbon, is a clear colorless fluid, somewhat volatile, which acts as a sensitizer on the ammonium nitrate. With this explosive, under certain conditions, no primer has been necessary. It has been shot both with and without primers. Methanite has an approximate weight strength of 70 percent and bulk strength of 45 percent. Its speed is about 13,000 fps compared to about 11,500 fps for Nitro-Carbo-Nitrate. At one Ohio strip mine, hole spacing was increased from 35 to 40 ft in 75 ft of overburden when Methanite was used, the powder factor increased from six cu yd per lb to seven cu yd per lb and better fragmentation secured.

### Liquid Oxygen Explosives

Improved manufacturing techniques have resulted in substantially lower prices for liquid oxygen explosives. This explosive, whose speed exceeds 17,000 fps, has substantially lowered shooting costs for many of us and has been particularly valuable in high banks containing massive sandrock. At our own No. 8 Mine, costs of shooting with the conventional fixed explosives were so high that it resulted in the abandonment of some pits. These pits are now being re-activated and shot with liquid oxygen explosives, and the coal is being produced at a profit.

### Multiple Decking

There has been a very marked increase in the use of primacord throughout the industry. This has been due to the increased use of less sensitive explosives, the great increase in deck loading due to higher banks, and the increased use of MS delay connectors.

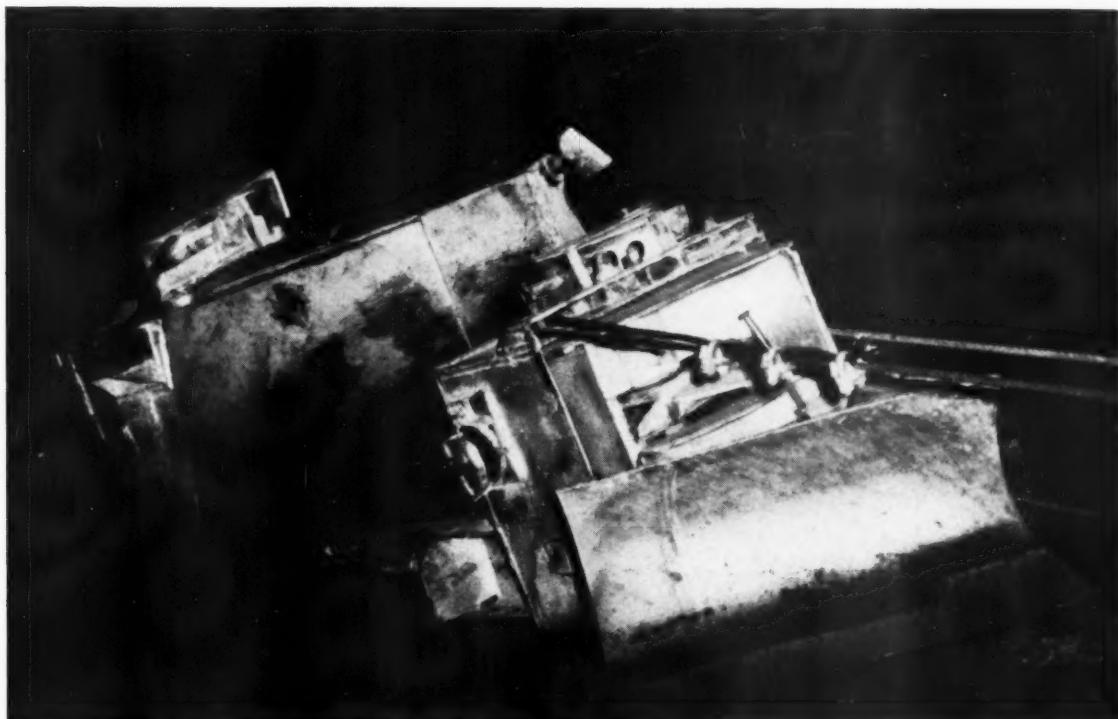
At our No. 8 Mine, by using primacord, we are using a method of shooting which we call multiple decking. On occasion, at this mine, we may encounter 50 ft or more of solid sandrock and, in cases like this, even four decks would not do a satisfactory job; not because of the load factor, but because the explosive was not properly distributed in the hole. We have determined by experience, the build-up of each of the holes and also by experience we know just how many shovelful of stemming are required to build up a certain distance. Therefore, as the shooter distributes the cartridges in the holes, his helper puts in the required amount of stemming between the cartridges, and it is quite amazing how accurately they can load a hole without any measuring except for the last one or two cartridges which are usually put in by measurement by another helper who usually finishes stemming the hole.

The four-man crew can load six to ten holes with anywhere from eight to 14 cartridges, depending on the depth of bank, and shoot them within one hour. Results, despite heavy rock, have been very good. We have been able, in heavy rock, to maintain a load factor of seven yd. Of course, this type loading could only be done with a high speed explosive because the low volume—low strength explosives require a primer in each hole. This, of course, would make the cost of multiple decking prohibitive.

### Problem of Vibrations

Mining heavier overburden and the resultant increase in the amount of explosives needed per hole and per blast has intensified the problem of vibrations due to blasting. Such vi-

(Continued on page 40)



The two-ton experimental phosphate planer was designed and built in Spokane by Bureau of Mines personnel in early 1954. It measures 12 ft long, 30 in. wide, and 38 in. high

# An Experiment in Continuous Mining of Phosphate Rock

**This review of the experimental work done with a planer in an underground phosphate operation indicates that long-faced planer mining is well worth investigating for mining many of the softer ores that occur in tabular or bedded deposits.**

**By T. E. HOWARD and F. E. BURNET**

Supervising Mining Engr.  
U. S. Bureau of Mines

Superintendent  
Montana Phosphate Products Co.

PLANNER-TYPE continuous miners are relatively new in the United States and since they have only been used in coal mines in this country, many miners may be unfamiliar with this type of equipment. Planers, as the name implies, operate on much the same principle as a common wood plane. The machine is pulled along the mining face, with a separate hoist, so that the blade chips or cuts a thin

slice from the solid ore as it travels. Thus, the planer is strictly a stoping machine.

## Development of Planer

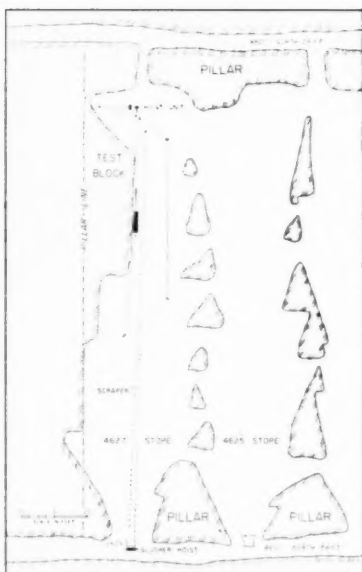
Development of the coal planer resulted from a wartime shortage of skilled labor in the German coal mines of the Ruhr district. During the war the district was hard pressed to maintain its output of high-grade coal,

and considerable research was conducted in an effort to devise new machinery and methods applicable to longwall mining. A number of devices were developed, the most outstanding of which was the coal planer.

The first coal planers were simple, fixed-blade plows designed for continuous longwall mining of thin beds of friable coal. Planers with vibrating blades were developed later in an attempt to apply the technique to harder coal.

The first use of a longwall planer in the United States was in a West Virginia coal mine in 1951, when an improved German fixed-blade planer was test-operated as part of a research project conducted cooperatively by the Bureau of Mines, Eastern Gas and Fuel Associates, and Mining Progress, Inc. The experiment proved successful, and the method is now in use in a number of coal mines in the East.

Our experimental work with the planer is part of a joint research pro-



The hoist unit used during most of the testing consisted of two identical compressed-air tugger hoists mounted on a common frame at right angles to each other. It was installed at the outer end of the slot, with the drum of the pull hoist parallel to the mining face and the return hoist facing down dip. Planing was up dip.

gram between the Bureau of Mines and the industry to develop low-cost, maximum recovery methods for mining western phosphate ores. Since these ores are not excessively hard and normally occur in inclined beds, which are reasonably uniform as to width and grade over large areas, the investigation of some sort of con-

tinuous miner was indicated. The planer was selected because its small size, light weight and relative simplicity seemed to offer the best possibilities for adaptation to mining conditions in beds dipping from 20° to 60°.

The experimental phosphate planer was designed and built in Spokane by Bureau of Mines personnel in early 1954 for testing in the Anderson mine of the Montana Phosphate Products Co. Experiments were started in April 1954, and since then five tests have been completed. The company developed the test areas, furnished some of the auxiliary equipment and provided operators and other necessary labor and services.

### Two-Ton Phosphate Machine

The phosphate planer is 12 ft long, 30 in. wide, and 38 in. high; it weighs two tons. It consists essentially of a welded-steel carriage in which are installed five 80-lb pneumatic paving breakers, so mounted that the breaker chisels enter the solid phosphate rock at an acute angle as the machine is pulled along the mining face. Four of the breakers are contained in a wedged-shaped housing which diverts the broken ore away from the face. The offset fifth breaker is hinged at the rear to the top of the housing and supported on a pneumatic leg for vertical adjustment, so that a bed with moderate variations in thickness may be mined full width. All of the breakers were modified and the mountings constructed to incorporate individual automatic throttle control. The throttle opens only when there is pressure on the chisel and the breaker is doing useful work.

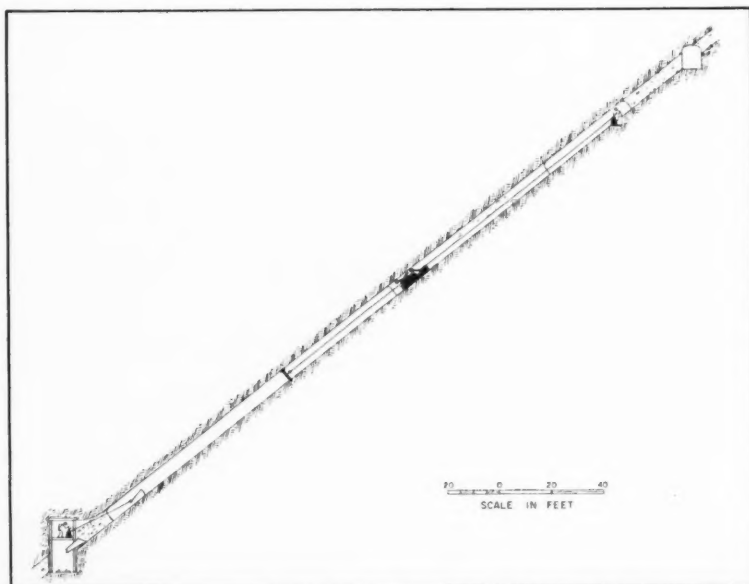
Unlike a coal planer, the phosphate machine is supported on four pneumatic-tired wheels, two at each end. The purpose of these wheels is twofold: first, to cut down the friction load, thus reducing hoist requirements; and, second, to provide the crowding action necessary to keep the planer tight against the face during its travel. Crowding is accomplished by turning one or both sets of wheels to skew the machine into the face as it is moved along.

### Method of Mining

The minable bed at the Anderson mine is made up of a number of bands of oolitic phosphate rock of moderately varying grade and hardness, separated by distinct partings and occasional thin seams of phosphatic clay. Within the bands the rock is closely jointed at right angles to the bedding. The bed averages about 4½ ft in thickness and dips from 25 to 45°. The hanging wall is a hard, massive, cherty quartzite, and the footwall rocks are silty sediments which are generally quite hard.

Mining at the Anderson is normally by a room-and-pillar method, with the room face advancing up dip. Comparatively little extra development work was required to provide faces for test operation of the planer. Most of the testing has been done on small blocks of ore near the upper ends of stopes between the 4600 and 4800 levels. These stopes were driven in the normal manner to within 100 ft of the 4800 sill, then narrowed to raise width and continued to the sill, leaving an unmined block at one side. To complete development of these experimental blocks for planer mining, it was necessary only to drive slots at the top, 15 to 20 ft below the 4800 drift. No special provisions were made for movement, within the stope, of ore broken by the planer. The slusher employed in the regular mining method was left in place, and muck was scraped to the chute while the planer was idle.

The hoist unit used during most of the testing consisted of two identical compressed-air tugger hoists, each rated at 2700 lb rope pull, mounted on a common frame at right angles to each other. It was installed at the outer end of the slot, with the drum of the pull hoist parallel to the mining face and the return hoist facing down dip. The pull rope was led through a sheave in the face of the slot; then back through a block in line with the mining face; down through a sheave on the face side of the planer; back through a second block in line with the face; then back down and dead-ended to the planer for a 3:1 mechanical advantage. Planing was up dip. The head blocks were moved inward as the face was advanced to keep the line of pull parallel and as close as possible to the mining



This vertical section of the 4627 test stope shows the operating set-up. The minable bed averages 4½ ft in thickness and dips from 25° to 45°.



Plan, portion of Anderson mine, showing test areas

face. As the dip of the bed in the test areas was just at or below the angle of repose of the broken ore, some muck piled up behind the machine during the planing pass and planer had to be pulled back down to the bottom of the block.

The operating crew consisted of two men, a hoist operator and a hose tender. In addition to keeping the air hose clear, the hose tender set timber where required. Stulls, six to ten ft apart, were installed in lines at about eight-ft intervals as the face was advanced.

### Production Performance

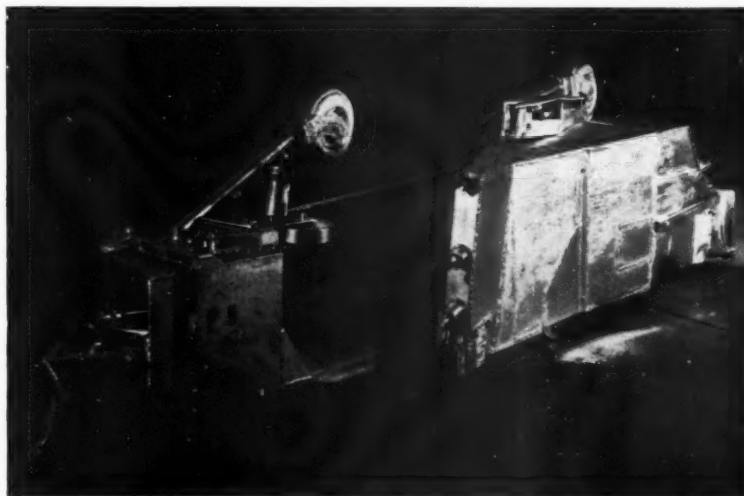
Time studies were conducted during some of the tests to obtain an idea of the production potential of planer mining. Naturally, productivity varied greatly because of the experimental nature of the operation and the different operating conditions. Best performance was during the third test in 4627 stope, when a block of ore containing 1070 tons was mined in 17 operating shifts for an average of 62.9 tons per shift. Planer operating time per shift averaged 2.37 hours, giving an average production of 26.62 tons per operating hour. These figures should not be considered representative of the potential of a production planer in a systematized operation. This is evident from the variation of 14 tons per operating hour during the

minimum shift to 59 tons per operating hour, or almost 30 tons per man-hour, during the maximum shift. For comparison, average production per man-shift at the face with the regular stopping method is 30 tons.

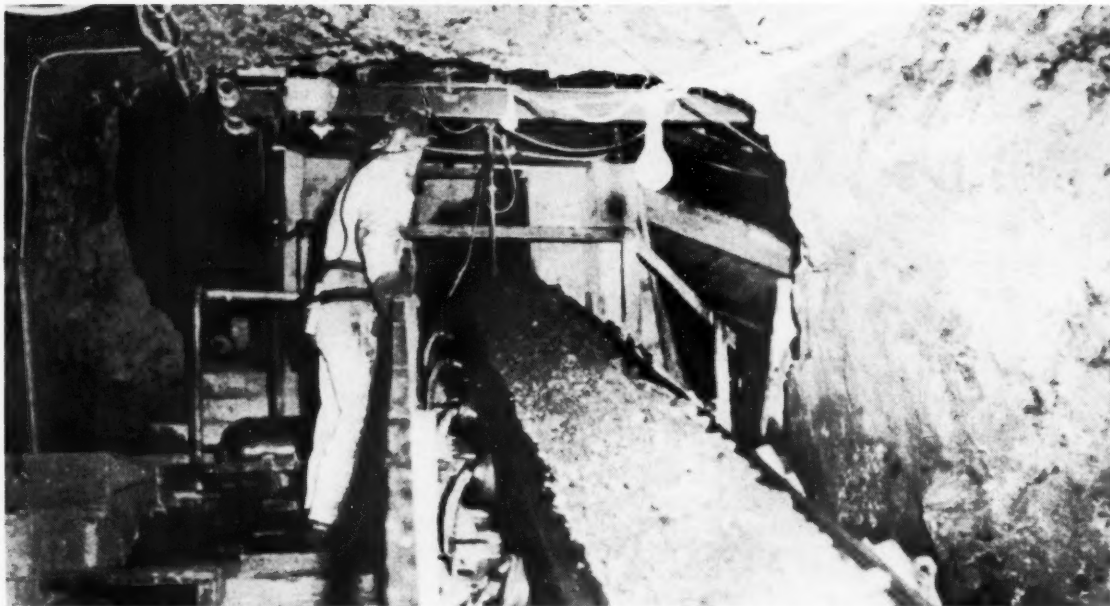
It should be emphasized here that this phosphate planer is a purely experimental model and was never intended for a production machine. It

was built cheaply, and a number of features that obviously would be desirable in a production machine were omitted in the interest of economy. This minimum machine was intended only to determine the applicability of planer mining in phosphate ore; that is, whether it could be chipped continuously, and to point out major de-

*(Continued on page 40)*



Unlike a coal planer, the phosphate machine is supported on four pneumatic-tired wheels, two at each end. Crowding is accomplished by turning one or both sets of wheels to skew the machine into the face as it is moved along



One of the "feeder" conveyor belts. In background, ore is dropping off into a gravity chute and onto the main conveyor belt

# Ore Conveyors at the Pend Oreille Mines & Metals Co.

**Since installed in July 1950, this conveyor system has transported more than 1,300,000 tons of material to the surface. Here is a complete report on this installation, covering the general setup, electrical design, controls and protective devices. Operating experience is also given**

**By R. M. GILBERT and A. A. BULEN**  
Westinghouse Electric Corp.

NEAR the town of Metaline Falls, Wash., deposits of underground ore bodies were found dipping at an angle below horizontal. A natural access to the ore was by means of an inclined sloping shaft rather than a combination of horizontal tunnels and vertical shafts. The slopes made possible the application of a belt conveyor system for transportation of materials to the surface.

This transportation system involves the ultimate development of four operating levels each feeding into the main conveyor system. Primary storage bins for both ore and waste at each level allow simultaneous mining operations at all levels. However,

when material is being transported to the surface, loading of the main slope belts is confined to a single particular loading station.

Figure 1 shows the general arrangements of the conveyor system with the four loading stations. Station No. 1, the highest underground station, is at the lower end of the upper main slope belt and 1400 ft down the slope from the surface portal. Station No. 2 is an additional 1100 ft down the slope below station No. 1 and at a 616-ft vertical elevation below the portal. The slope is extended downward at approximately the same angle to station No. 3.

Each main slope belt discharges

material at its upper end into a gravity chute and directly onto the lower end of the next higher slope belt (Figure 1). The material is thus carried to the surface portal and discharged directly onto another belt running at approximately right angles. This latter belt, called the "surface belt," carries the material to another belt conveyor system known as a "tripper" which deposits the material into storage bins depending upon the type of material being transported.

Each underground loading station (Figure 2) is functionally the same and consists of: storage bins for the material as it is mined; vibrating grizzlies for by-passing the fines; primary jaw crushers for crushing the material to approximately four-in. size; storage pockets for crushed material; vibrating feeders taking the material from the pockets; and belt conveyors feeding onto the corresponding main slope belts. Electromagnets are installed for collection of tramp iron at the point where the feeder belt discharges onto the main slope belts.

## Ore-Waste Transportation

This is accomplished by electrically interlocking those parts of the system which carry lead-zinc ore and/or

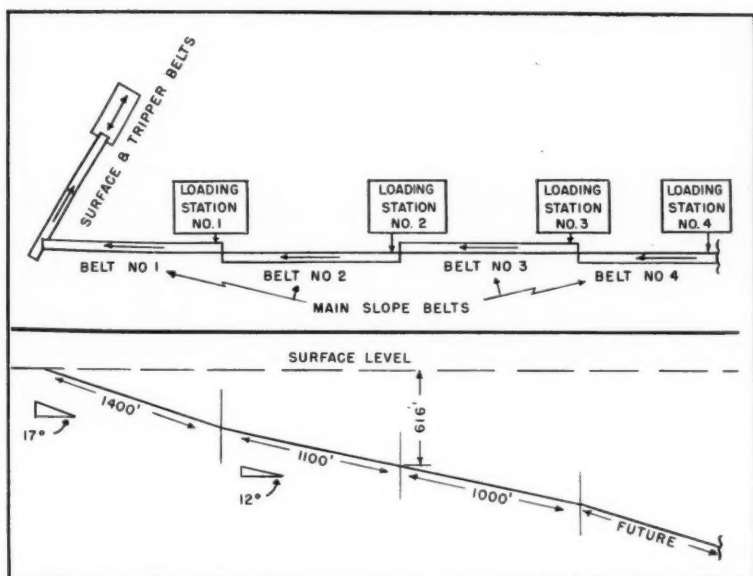


Fig. 1—General arrangements of the conveyor system with the four loading stations

waste. Ore only or waste only can be transported at a given time. If, for instance, ore is being transmitted from underground station No. 1 to the surface tripper and the operator attempts to change to transportation of waste, the following events occur automatically:

- (1) Ore feeding from underground station No. 1 is automatically stopped.
- (2) A timing relay allows the feeder belt, the top main slope belt, the surface belt and the tripper to empty their loads in the ore stock pile.
- (3) The tripper moves to its position over the waste pile.
- (4) An indicating lamp on underground station No. 1 lights and indicates to the operator that he may now successfully start the waste system.

Likewise, the same functional automatic sequence occurs if waste is being transported and the operator attempts the change to ore transportation. Serious contamination of the surface stock piles could occur without this timing and interlocking feature.

### Single Operator Control

At the present time, a single operator performs the primary crushing in addition to handling the entire conveyor system. He has control of all conveyors and vibrating feeders from the source to the surface discharge. He may stop any individual conveyor component at will.

If the operator has fulfilled the requirements at any loading station and desires to transport the opposite material (waste or ore) at another station, he can transfer the control before leaving and thus the system can proceed through the change-over while he is traveling and be ready

for the selected transportation when he arrives at the new station.

Each control station has a "master stop" push button which shuts down all components simultaneously.

A telephone system in the mine is used by the operator to request inspection if control board lamps indicate trouble somewhere on the system.

### Operate and Test Control

This is desired so that individual components could be run independently without interlocking, and is used

for testing and maintenance purposes. Included on the control panels are a set of push buttons and a rotating control switch for each conveyor component. The rotary switches are three-position types and can be set at "Test," "Off," or "Operate." "Test" position allows operation without interlocking with the rest of the system. It can be started and stopped by push buttons from the local location; and starting of the device from a remote location is impossible. The "Off" position completely isolates the device whereby it cannot be controlled either locally or remotely. The "Operate" position transfers the control to any remote location and makes starting from the local position impossible. Any remote station can then start and stop the device but the local stop push button remains in the circuit to allow stopping in an emergency.

### Sequence Interlocking

This was incorporated into the control as a straightforward sequence interlocking. If, for any reason, any conveyor belt stops, then all conveyor belts between it and the source of material feed automatically shut down to prevent piling of material on the belt which has initially stopped. All other conveyor belts towards the discharge end of the system remain running.

### Supervision of Belt Overloading

Occasionally the belts are started fully loaded with material and the belt manufacturer imposes certain

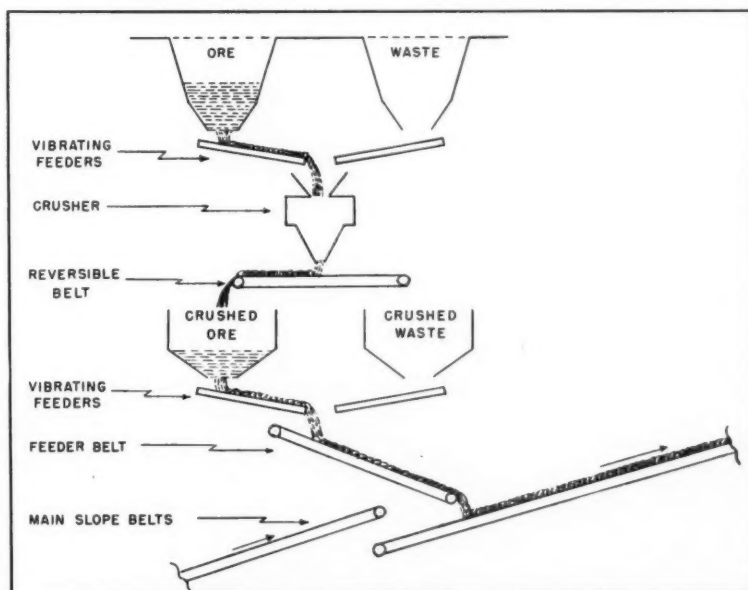


Fig. 2—Typical underground loading station. The entire conveyor system is designed to carry two types of materials, lead-zinc ore and waste, without danger of mixing or contamination of the surface stock piles. It is controlled electrically by a single operation from any of the underground stations



Loading equipment and diesel trucks underground

limitations with regard to maximum belt tension. When an overload occurs, a timing relay is set into motion which performs the following functions:

(1) After a short time delay, stops material from feeding onto the conveyor system and at the same time operates warning lights and sounds alarm bells at all stations.

(2) If, after a further time delay the overload persists, all control is automatically disconnected and the entire system is shut down and electrically locked out.

The main slope belt in distress is then visually inspected and the trouble cleared before the system is released from the locked-out condition.

The above sequence occurs as a result of nominal overloading conditions. Protection against blocked rotation such as fouling of the mechanical equipment is provided for by a sepa-

rate relay. Operation of this latter relay provides instantaneous shut-down of the entire system.

The wound-rotor motors driving the main slope belts are equipped with extended shafts and thruster-operated brakes. In addition, a ratchet and pawl device is mounted on the head pulley shaft to prevent backward movement of the belt in the event it is stopped under load conditions. The pawl is raised and lowered by solenoid action which is, in turn, controlled by a zero speed switch.

All conveyors other than the main slope conveyor are protected from overload by application of correct motor sizes and conventional thermal bimetal overload heaters.

### Electrical Design

The design of the over-all system involved a detailed coordination of all related electrical components.

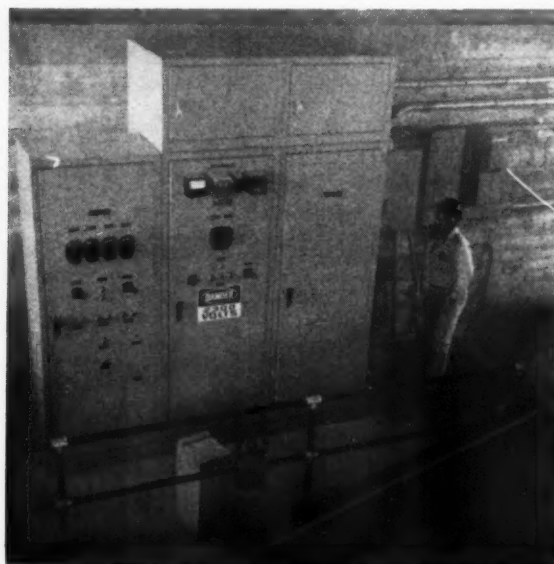
Standard industrial control devices were used throughout and considerable effort was made towards simplification without sacrifice of performance. The control voltage source is a 230-v d-c dry-tape rectifier located at the top station.

### Operating Experience

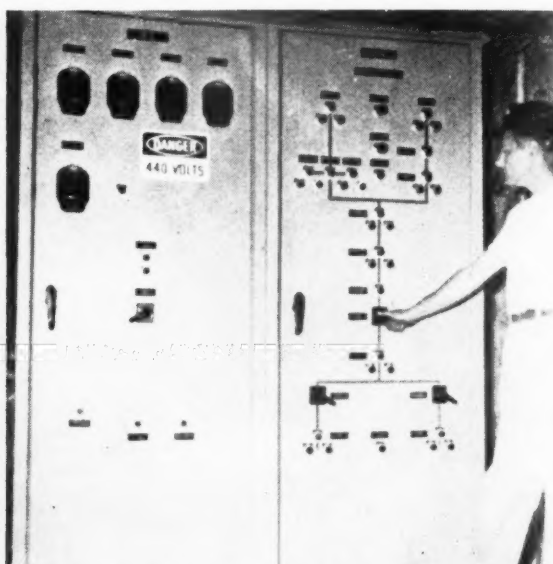
Since initially installed in July 1950, the conveyor system has transported more than 1,300,000 tons of material to the surface. After a few initial discrepancies, the controls were field corrected and have since performed with no more maintenance than any standard industrial control requires. Although the control is located in an underground area of high humidity, the strip heaters within the control structures have completely prevented corrosion. The usual difficulties in trouble shooting complex control have been minimized by the use of Test-Operate control switches and master disconnecting switches which completely disconnect the entire control station from the main slope control cable.

The system, as intended, has resulted in a continuous transportation of material to the surface facilities. Underground storage bins of primary crushed materials are emptied at any station and the operator moves to the next level to repeat the process.

The requirement of single operator control has been successful and the operator performs the additional task of controlling the primary crushing at the underground loading stations. To date, records indicate no contamination of ore or waste in the surface storage facilities due to faulty electrical control. The main slope belt overload supervision devices have functioned occasionally, giving the necessary warning and shutdowns.



Motor control for first level, and for surface and tripper belts



There is an underground control station at each level

Standard ground-  
ing wire from ordi-  
nary shovel cable.

Rubber-cored  
grounding wire  
from Anaconda  
Shovel Cable.

**PHOTOGRAPH** of grounding wires from actual cables. Note how wires in ordinary shovel cable have kinked and broken in service — while Anaconda's patented rubber-cored grounding wires show no sign of damage.

Look how Anaconda's rubber-cored grounding wires

## keep cable on the job and out of the shop

When shovel cable is moved in mining operations, ordinary grounding wires tend to move within the cable—to kink and break during bending, as the actual sample on the left shows.

In contrast, Anaconda's patented rubber-cored wires, right, conform more readily when compressed or bent. Every wire in every strand is cushioned. No kinks or breaks occur.

Rubber-cored grounding wires also have larger diameters—this provides (1) broader contact and shielding and (2) reduces tendency of the ground wires to cut the individual wires in both the shield and the grounding wire.

The only shovel cables made with rubber-cored grounding wires are made by Anaconda. For more information, call the Man from Anaconda or see your Anaconda distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

041222



**LARGER DIAMETER** of Anaconda's rubber-cored grounding wire, unlike ordinary grounding wire, will not cut insulation if cable is crushed (diagram 1). In addition, it provides broader contact with the shielding, provides a more positive ground (diagram 2).

\*Patented by Anaconda

ASK YOUR **ANACONDA**® DISTRIBUTOR  
ABOUT SHOVEL CABLE



In planning the Joanne plant it was necessary that the fine coal circuit and the water clarification system provide a maximum recovery of merchantable coal, a controlled solids content for the circulating water and a method conserving the maximum amount of water. Requirements of anti-stream pollution legislation also had to be satisfied

# Joanne Coal Preparation Plant

**A description of a 350-tph coal preparation plant designed for producing a clean coal for both the industrial and utility markets**

**By CLINTON C. CORNELIUS**

Vice-President, Operations  
Joanne Coal Co.

THE NEED for a coal preparation modernization program at the Joanne Mine of the Joanne Coal Co., located at Rachel, W. Va., was foreseen in 1954 due to the ever increasing demand for a better marketable coal. To meet this challenge, a very complete study had to be made of the coal within the Pittsburgh Seam to determine the extent to which the ash and sulphur content of the raw coal could be lowered. The results of this test work materialized into a 350-tph plant designed for producing a clean coal for both the industrial and utility markets. The preparation plant has been operating since September 1955, producing a uniform metallurgical and steam coal through the process of washing, drying and sizing.

## 2000-Ton Storage Bin

The Joanne preparation plant was designed to receive run-of-mine coal from four-ton mine cars elevated by cages to a dump hopper within the screening and loading tipple. From the dump hopper the run-of-mine coal is conveyed to a heavy-duty vibrating screen removing the plus five-in. ma-

terial. The larger sizes after crushing to a minus five-in. product are recombined with the minus five-in. material from the vibrating screen and conveyed to a four-compartment, 2000-ton, concrete storage bin. The bin serves two purposes; first, the four compartments permit storage without the contamination of the mine's low, medium and high sulphur coal. By suitable vibrating feeders under each compartment, feeding to a common conveyor, a desired blend of coal can be obtained to suit the plant's immediate metallurgical or steam coal requirements. Second, the bin permits a continuous flow of coal to the preparation plant independent of the interruptions which may occur from the mine to the storage bin.

## Coal Recovery Performed by Jigs and Tables

The raw coal collecting belt conveyor under the storage bin transfers the coal to an elevating flight conveyor discharging into the feed sluice of the Link-Belt parallel bed air-pulsated wash box. The jig handles the job of cleaning the 5 by ¼-in.

coal and conditions the ¼-in. by 0 coal prior to further cleaning on Deister Tables. The 5-in. by 0 clean coal from the jig is discharged onto two horizontal vibrating screens for dewatering and making a size separation at ¼ and ¾ in. The plus ¼-in. clean coal product is conveyed by belt conveyors to the screening tipple for further screening or recombining before loading into railroad cars.

The minus ¼-in. by 0 coal from the horizontal vibrating screens is sluiced to a drag tank designed to make a 100-mesh separation. The ¼ in. by 100-mesh solids as conveyed by the drag tank conveyor are discharged into a sump and combined with the crushed middlings from the jig and pumped to two seven-way distributors that feed equal quantities of ¼-in. by 0 coal to 14 coal washing tables.

Clean coal from the tables at the rate of 128 tph of solids combined with 870 gpm of water flow across two screens having 28-mesh openings onto two horizontal vibrating screens equipped with 48-mesh openings. Refuse from the tables is dewatered on

a horizontal vibrating screen having 28-mesh openings and combined with the jig primary refuse for conveying to plant washery refuse bin.

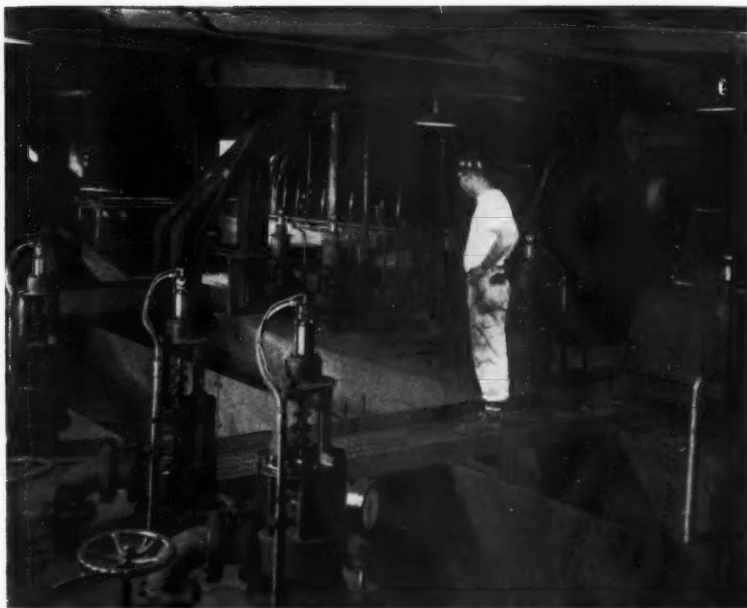
The  $\frac{1}{4}$  in. by 28-mesh clean coal from the horizontal dewatering screens discharges onto a distributing flight conveyor feeding three Reineveld centrifugal dryers. One Reineveld unit is maintained as a spare. The moisture is reduced to about seven percent in the centrifugal dryers, and further reduced to about one percent surface moisture, if so desired, by the Multi-Louvre heat dryer. Dust as collected from the heat dryer Amerclone dust collectors may be returned to clean coal or blended in with the furnace fed coarse coal.

Cleaned and dried, the  $\frac{1}{4}$ -in. by 0 coal can be conveyed directly to the screening tippie and loaded into railroad cars. Provisions are also available to convey the dried  $\frac{1}{4}$ -in. by 0 coal to a separate 500-ton storage bin from which it can be mixed with the larger size metallurgical coal.

Underflow from the  $\frac{1}{4}$ -in. by 0 clean coal horizontal dewatering screen, 28-mesh by 0, is combined with a portion of the drag tank overflow, 100-mesh by 0, and flumed to an 80-ft. coal thickener. That portion of the drag tank overflow not returned to the thickener for clarification flows directly back to the main plant circulating sump.

### Thickeners

The coal thickener has an average feed capacity of 1710 gpm of an eight percent solids pulp and maintains an average overflow of 1490 gpm at less than 0.5 percent solids. The thick-



The jig handles the job of cleaning the 5 by  $\frac{1}{4}$ -in. coal and conditions the  $\frac{1}{4}$ -in. by 0 coal prior to further cleaning on tables

ener design incorporates a special center feed well basket, revolving rakes and automatic rake lifter mechanism, which does not disturb the uninterrupted settling action of the coal solids. The pulp as collected in the apex of the conical bottom section of the thickener is withdrawn by a diaphragm pump at approximately 42 percent solids and discharged into a sump for pumping by centrifugal means to a 12-disc vacuum filter

equipped with Saran cloth bags. The vacuum filter recovers 46 tph of fine coal that can be delivered to the heat dryers for mixing with larger coal, or can be diverted to refuse.

The clarified overflow water from the coal thickener is used to provide table dressing water and the excess is returned to the main plant circulating sump for jig use.

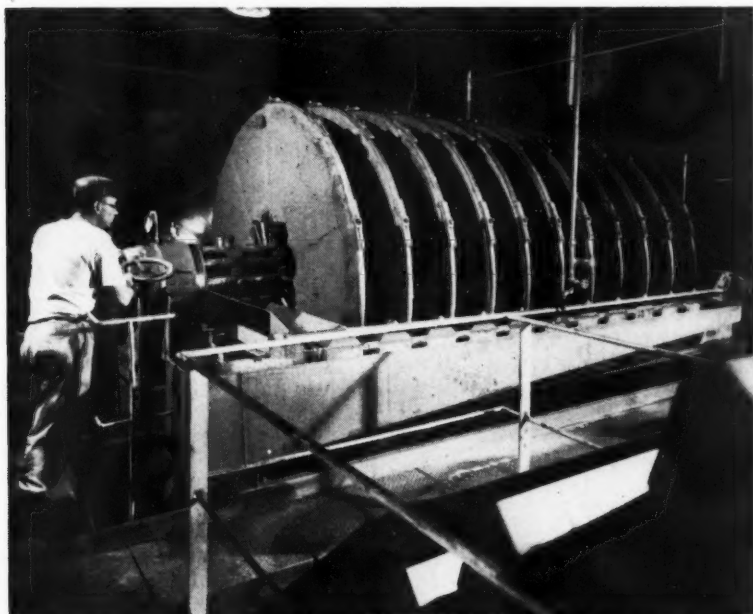
The water from the horizontal refuse screen containing minus 28-mesh clay and slime solids was designed to discharge into a 35-ft refuse thickener which has been installed to further close the water circuit. The thickener has a designed feed capacity of 314 gpm of water containing six percent solids. To maintain a clear clarified water overflow from the refuse thickener free of clay and slimes, flocculation equipment will, no doubt, have to be added. Pumping provisions have been installed to deliver the flocculated clay and slimes to a settling pond.

### Future Plans Include Filter

At the present time, this thickener is being by-passed and the refuse water drained to a settling pond. Future plans include the installation of a filter to work in conjunction with the 35-ft refuse thickener. Present analysis indicates that this thickened, filtered material would go to refuse.

In planning the Joanne plant it was necessary that the fine coal circuit and the water clarification system provide the following:

- (1) A maximum recovery of merchantable coal.
- (2) A controlled solids content for the circulating water.



The vacuum filter recovers 46 tph of fine coal that can be delivered to the heat dryers for mixing with larger coal, or can be diverted to refuse

Analyses	Thickener Influent	Thickener Underflow	Thickener Effluent	Filter Filtrate	Wash Box Circulating Water
Percent Solids . . .	7.6	42.0	0.3	0.7	3.9
Ash Analyses					
+325M . . . . .	4.28%	5.53%	27.43%	12.64%	6.20%
-325M . . . . .	24.20%	21.56%	46.73%	29.30%	21.42%
Screen Analyses					
+28M . . . . .	10.21%	8.95%	0.97%	1.40%	0.09%
28M x 48M . . .	22.29	20.10	2.36	4.16	0.97
48M x 100M . . .	19.88	18.90	2.94	8.95	10.58
100M x 200M . .	13.00	14.48	3.00	14.70	20.31
200M x 270M . .	5.35	6.09	1.73	7.56	8.95
270M x 325M . .	3.35	4.53	0.60	5.92	7.08
-325M . . . . .	25.83	26.95	88.40	57.31	52.02
Total . . . . .	100.00%	100.00%	100.00%	100.00%	100.00%

(3) A method conserving the maximum amount of water.

(4) Satisfy requirements of anti-stream pollution legislation.

The final fine coal recovery and water clarification process in the plant centers around the 80-ft diam thickener and the disc vacuum filter. (Eventually the 35-ft diam thickener will be used with a vacuum filter to avoid the necessity of fluming water from the refuse dewatering screens to a pond.)

Maintaining a separate water circuit for the water from the refuse dewatering screens prevents contami-

nation of the 80-ft coal thickener feed and permits the resulting product from the vacuum filter to be acceptable as clean coal at all times.

### Coal Thickener Performance

Typical performance data taken during actual operation of the thickener and filter are shown above in Table I.

It will be noted that the thickener influent is less than ten percent. Coal thickener performance is usually evaluated with respect to plant circulating water. It is the opinion of some coal

cleaning plant operators that best jig performance is obtained when the circulating water does not exceed ten percent solids. The Joanne plant is operating with four percent solids in the circulating water made possible by a thickener effluent containing less than 0.5 percent solids. The vacuum filter filtrate averages less than one percent solids and the thickener underflow averages between 40 to 45 percent solids.

The high ash analysis of the minus 325 thickener effluent solids indicates to a degree the amount of clay within the plant water circuit. Although this percentage appears to be high it represents a very minute quantity within the thickener effluent.

The thickener underflow screen analysis indicates approximately nine percent plus 28-mesh material that must be filtered. This percentage is within the range for optimum vacuum filter performance.

For successful cleaning operation and maximum recovery of fine coal, where coal recovery is performed by jigs and tables, adequate water clarification is necessary to maintain a consistent marketable product. The Joanne plant meets this requirement for the immediate and future markets.

## Drilling and Blasting

(Continued from page 30)

brations, however, are being reduced very substantially by the use of MS delay connectors, the use of which is becoming very widespread throughout the industry. The delay connector has not only helped the vibration problem but has helped to improve fragmentation in most cases.

The relatively high cost of the delay connector itself, however, has prompted further work on the development of various types of blasting timers which can detonate explosives at either pre-timed or variably timed intervals. Several years ago, a number of these blasting timers were in use but necessitated very complicated wiring inasmuch as each of the leads from the cap had to be brought back to the timer itself. Where a great many holes were to be shot, this resulted in complicated wiring and, on occasion, missed holes.

Hanna Coal Co. has under development a timer which utilizes a cable, the leads going directly from the cable to the hole. Up to now, this has not been utilized for over ten holes but it has proven quite effective in reducing the amount of primacord and expense of the delay connectors.

Other new improvements in drilling and blasting procedures are constantly being sought out by the stripping industry. Increased research on the part of the coal companies in-

dicates that neither the machinery nor explosives manufacturers can afford to become complacent with regard to their products but must continue to strive to produce lower cost and more efficient drills and explosives.

## Mining of Phosphate Rock

(Continued from page 33)

sign flaws before a production planer was attempted. As could be expected in a development of this kind, a great many unanticipated difficulties were encountered. With a properly designed planer, an adequate hoisting and slushing layout, and an operation geared to planer mining, much better performance should be possible. The planer was modified after each period of test operation to incorporate design changes indicated to be desirable by the previous test. Many different operating techniques were tried. The machine has been tested under a fairly wide variety of ground conditions, and the point has been reached where we feel we have enough design information to build a planer considerably closer to a production machine. Design work on the new model is almost complete, and construction will be started shortly.

### Possibilities Great

The test work has shown that phosphate rock of the character encountered at the Anderson mine can be

planed and has indicated that most of the design features desirable in a production planer can be incorporated in a practical machine. It has also pointed up some of the advantages of long-face planer mining.

Elimination of blasting left the walls comparatively undisturbed, reducing the hazard from falling ground and decreasing the possibilities of dilution. This was very apparent in some of the test areas where the hanging-wall chert was thin and had been badly cracked by blasting during the regular stoping operation.

Where the hanging wall was competent, pillar requirements were reduced, permitting wider stopes and increasing over-all recovery. Ore under weak hanging walls was mined safely because the machine requires very little working room and timber support could be carried close to the mining face.

A major feature was the indicated improvement in productivity, both in tons per man-shift and tons per working place. Elimination of blasting costs and consequent simplification of ventilation circuits were other important benefits.

All these things, of course, add up to safer working conditions, increased recovery and lower production costs.

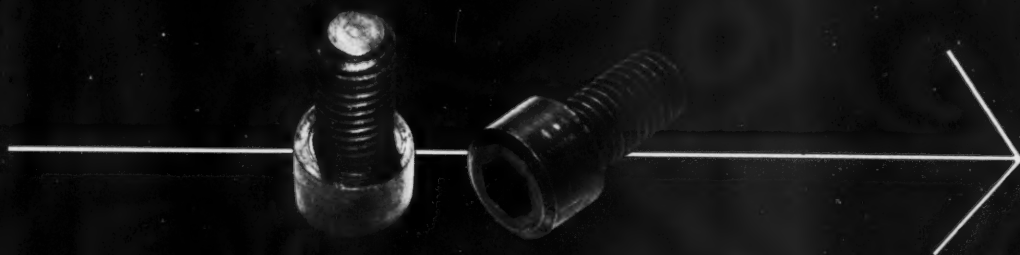
The full potential of long-face planer mining has yet to be proved, but its possibilities are so great that it is well worth investigating for mining many of the softer ores that occur in tabular or bedded deposits.



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Analyses	Thickener Influent	Thickener Underflow
Percent Solids ...	7.6	42.0
Ash Analyses		
+325M .....	4.28%	5.53%
-325M .....	24.20%	21.56%
Screen Analyses		
+28M .....	10.21%	8.5%
28M x 48M .....	22.29	22.29
48M x 100M .....	19.88	19.88
100M x 200M .....	13.09	13.09
200M x 270M .....	5.35	5.35
270M x 325M .....	3.35	3.35
-325M .....	25.83	25.83
Total .....	100.00%	100.00%

(3) A method of  
mum amount of

(4) Satisfy  
stream pollution

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water clarifi-

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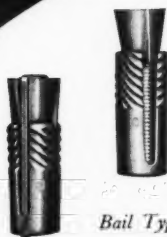
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# Powder Blasting at Britannia Mine

A mining method, referred to as powder blasting, has been developed and used successfully at a Canadian mine for primary breaking in large low grade orebodies where low production costs are of prime importance. The method is thoroughly described and performance data given

By **LEONARD L. ALLAN**

Mine Superintendent  
Britannia Mining and Smelting Co., Ltd.

THE TERM "powder blasting" as used at the Britannia Mine refers to a mining method which is used for primary breaking in large shrinkage stopes. This method is used where the orebody is 40 ft or more in width and where overbreak and caving are desired. Both the "old" and the "new" powder blasting methods will be described.

The Britannia Mine is located on the east shore of Howe Sound, about 30 miles north of Vancouver, B. C. The mine is owned and operated by the Britannia Mining and Smelting Co., Ltd.; a subsidiary of the Howe Sound Co. of New York.

The company offices and the mill are

situated at the Beach, on tidewater. The mine camp is in a mountain valley, five miles by road and 2200 ft in elevation above the Beach. The mine workings extend from a point 4400 ft above sea level to approximately 1000 ft below sea level and horizontally for 3000 ft. Daily production is 3500 tons of ore containing copper, zinc and gold. Iron pyrite is concentrated and can be shipped out in deep sea vessels to all parts of the world.

## Eight Orebodies Mined

The orebodies are located in a large shear zone in an extensive roof pendant lying on the western margin of the Coast Range batholith. The shear

zone has been traced for a horizontal distance of four miles and vertically for 5000 ft. The localizing influence appears to be minor flexures in the shear. There are eight orebodies which have been mined. The rock types associated with the orebodies are altered and silicified volcanics and can be classified in the ore zones as quartz chlorite sericite schists. In general the orebodies strike west-east and dip at 70° to the south.

The Britannia Mine is operated in several sections corresponding to the known orebodies each of which has its own peculiar characteristics regard-

## About the Author



**LEONARD L. ALLAN** was born in Arran, Scotland, and came to Canada in 1919. He worked underground in various mines in British Columbia during the summers of 1935-38 while attending the University of British Columbia. Graduating with a B.A.Sc. in Mining Engineering in 1939, he went to work for Britannia Mining & Smelting Co., Ltd., at Britannia Beach. He rose rapidly, becoming sampler, surveyor, mine engineer, shift boss, mine foreman, assistant mine superintendent and mine superintendent.

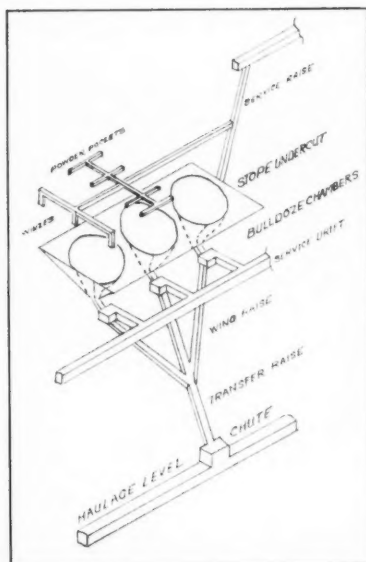


Fig. 1—Development for powder blast mining at the Britannia Mine

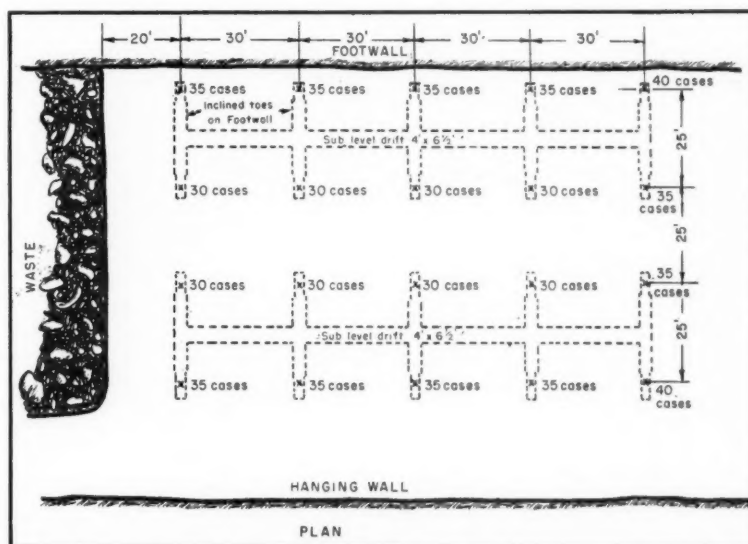


Fig. 2—Plain view of an ideal stope block development for powder blast mining (see figures 3 and 4 for sectional views)

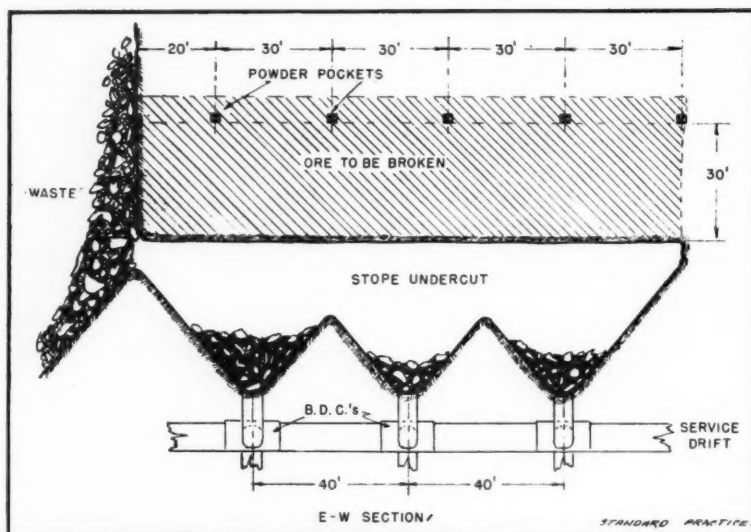


Fig. 3—The powder blast illustrated is a very large one. The number and spacing of the powder pockets varied according to the ground to be broken

ing mineral occurrence and wall rock conditions. Mining is carried out from the mountain top to the lower sections of the mine which are 5000 ft below the mountain top.

The mining methods used are many and varied. In mining the large Bluff orebody the use of powder blasting for primary breaking was found to be most efficient.

### Characteristics of Bluff Orebody

The Bluff is the largest orebody at Britannia extending vertically through practically the whole mine. It has been mined through a vertical range of 2500 ft. The greatest area was 200 ft in width by 1000 ft in length. It is a replacement type orebody with a geological footwall and a commercial hangingwall. It dips at 70°. This steep dip coupled with sub-commercial mineralization in fissile semi-siliceous hangingwall rocks greatly facilitates planning and breaking in the stopes by the powder blast method.

The powder blast method of mining is essentially large scale breaking into open stopes by the detonation of a calculated amount of explosive which has been confined in small mined out pockets. The technique is not new. It has been used at the Alaska Juneau, Britannia and Holden mines over a period of years.

Characteristics of the Bluff orebody which make it suitable for powder blast mining are:

(a) It is a large massive orebody whose values are distributed over a wide horizontal area and it has substantial depth.

(b) The footwall angle is steep enough to permit free drawing in an open stope.

(c) The ore fractures readily under the impact of a powder blast.

(d) The large dimensions of the orebody permit mining in blocks which are laid out so that retreat is from

west to east and downward. As blocks are mined out they break into the broken mass above and so become filled.

Points for consideration when the powder blast method of mining is proposed are:

(1) Consideration should be given to over-all ground stresses in the area where powder blasting is contemplated. This mining method is best suited to shallow mines where ground stresses are not great although distance below the surface is not a limiting factor.

(2) It is suitable where rapid extraction is required.

(3) No work is carried out in the stope. The development for future breaking and drawing of muck can go forward at the same time.

(4) The method can be put into operation using only conventional mining equipment.

(5) It is a relatively safe method for the mining of large orebodies.

(6) Caving into the stope following a blast is to be expected. This is advantageous. Planning for future blasts must await stabilizing of the

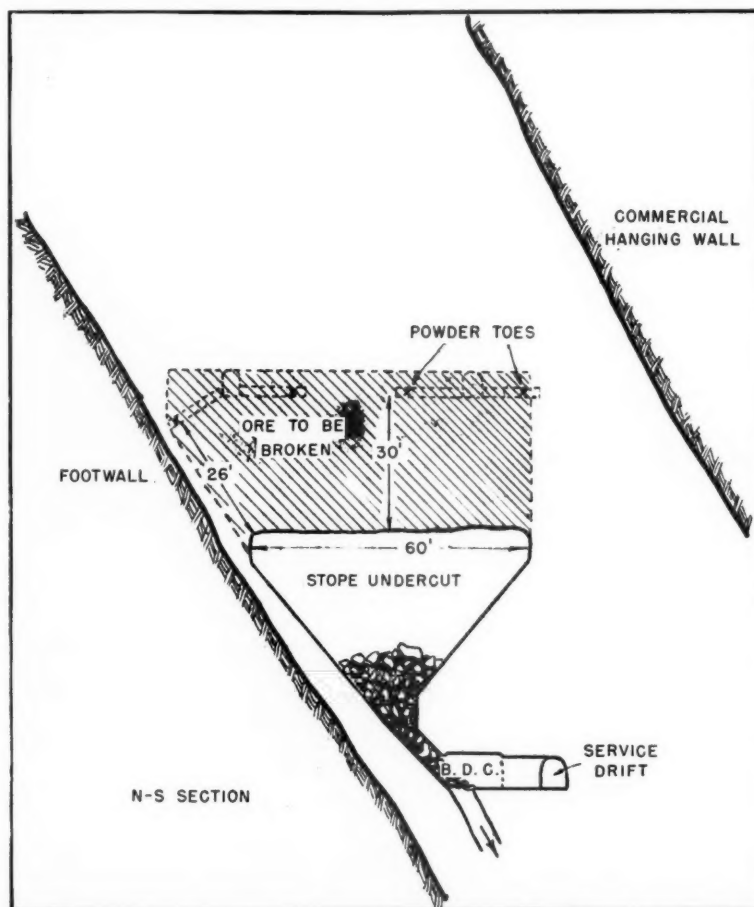


Fig. 4—The powder pockets when loaded were back filled with development muck which had been left in the heading for that purpose



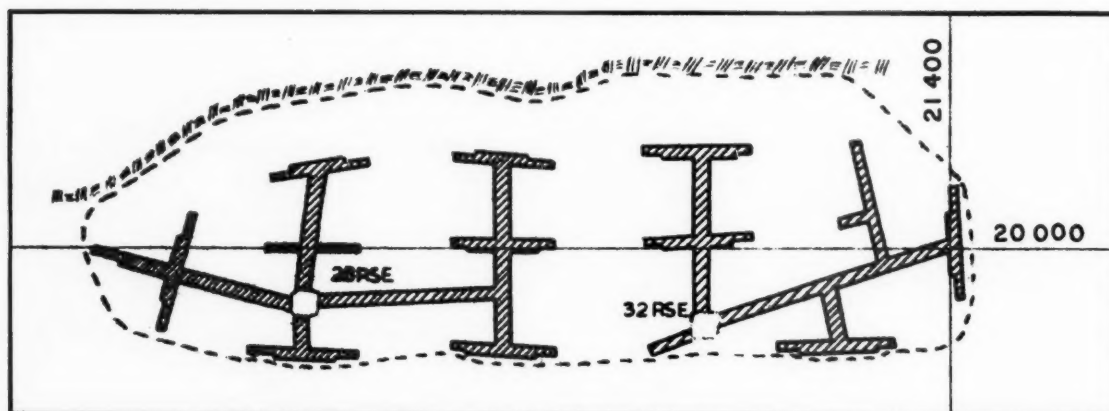


Fig. 7—A plan of the No. 1 powder blast

caused by the shock wave and air blast decided the operators to change to diamond drill blast hole drilling as their method for primary breaking.

Figure 5 shows a section of the orebody mined out by powder blast stoping. The level interval was 100 ft so that adequate control was kept on the hangingwall. Where the level interval was 200 ft powder blast mining was considered not suitable for the reason that stopes would be likely to take off into the hangingwall before the lift was completed. This was a main reason for the changeover to diamond drill blast holes for primary breaking. Percussion drills using sectional steel and tungsten carbide bits succeeded diamond drilling.

### New Approach to Powder Blasting

Neither blast hole method was completely satisfactory. Poor fragmentation—the ground broke in large sheets when the flat rings were detonated—a poor break along the stope boundaries on footwall and hangingwall and the need for considerable reblasting were unsatisfactory features of this phase in primary breaking. In carrying out stoping operations difficulty was encountered in removing pillars which were difficult of access and hard to break even when perforated with drill holes. Recourse was had to the use of single powder pockets using 10, 15 or 20 cases of powder for this purpose. This led to one fairly large blast where powder blasting was apparently the only solution to a stoping problem. This was in a stope below what was considered to be the lower limit in the mine where heavy blasting was safe.

Development of this blast incorporated some new features. The powder pockets had closer spacing and reduced burden from the previous standard. Also a variation from previous standards were the use of 75 percent Digel Powder and short period delay blasting caps. A completely successful result was obtained. Delay

blasting had given a complete break and better fragmentation than had been obtained by blast holes. The reduction of the shock wave by the use of short period delay blasting caps was such that no damage was caused to mining installations.

### Method Satisfactory

The success of the new approach to powder blasting was proved when a large low grade block which had been prepared for breaking by blastholes was broken by powder blasts instead. This was designated 20-31 Stope. It was a block of marginal grade ore 205 ft in length, 65 ft in width and 200 ft in vertical section containing 300,000

tons lying to the hangingwall of a stoped out area. This stoped out area had been filled.

Figure 6 is a section through the length of the block of ground to be broken showing the series of powder blasts.

The stope block was prepared for production by driving the 20-31 scraper drifts east and west from the top of the 22-31 raise. Two scrapers were set up back to back so that both scraper drifts could be worked at the same time. In this way two men per shift could draw all the stope compared with the number required to draw the same tonnage through bull-  
(Continued on page 73)

TABLE I. PERFORMANCE FIGURES FOR BREAKING IN THE 20-31 STOPE BY POWDER BLASTINGS.

Powder Blasting	Footage	Burden	Tons to Break Calculated	No. of Toes	Tons Broken	Cases of Powder Used
1.	734	27'	29,500	26	37,112	496
3.	270	26'	29,125	25	31,521	475
4.	375	20'		2		32
5.	20	23'	35,950	26	67,070	588
6.	438					
7.	259					
Totals	1,996	25' average	94,575	79	135,703	1,591

Tons per lb of powder, calculated 1.19; powder factor 0.84.

Tons per lb of powder, actual 1.71; powder factor 0.60.

Tons per ft of powder blasting development, calculated 47.38; actual 69.00.

Tons (average) per toe, calculated 1,197; actual 1,718.

Average loading, 20.1 cases per toe.

Overbreak, 43 percent.

Stope: Average length 205 ft, width 65 ft.

TABLE II. PERFORMANCE FIGURES IN THE 18-35 STOPE.

Two powder blasts—18 toes.			
Development Footage	Tons before Breaking	Tons after breaking	Cases Dygel
522	12,834	16,703	357
Tons per lb Dygel, calculated 0.72; powder factor 1.4.			
Tons per lb Dygel, after 0.94; powder factor 1.06.			
Tons per ft of powder blasting development, calculated 24.59.			
Tons per ft of powder blasting development, after blasting 32.00.			
Average tons per toe, calculated 713.			
Average tons per toe, after 928.			
Average loading: 19.8 cases per toe.			

# Power for Continuous Mining



Tests indicate the importance of using sharp bits on the Joy continuous miner to reduce power requirements and the cost per ton of bits

Two engineers consider the electrical power necessary for operating the continuous type of coal miners. The first comprehensive report is based on tests of the power requirements of five makes of continuous mining machines in 14 mines operating under widely varied natural conditions. The second article is a discussion of the first with added recommendations and conclusions

THIS paper is to consider the electrical power necessary for operating the continuous type of coal miners, which will, therefore, include the Joy "Continuous Miner," the Jeffrey "Colmol," the Goodman "Ripper," and the Lee-Norse "Miner." The results of 14 electrical load tests are presented and from the data this paper will show for the conditions encountered, the following:

(1) The peak load and average amperes required and average voltage supplied for these particular units.

(2) The desired capacity can be given for either the conversion substation to supply the d-c miners or the transformers to supply a-c miners.

By J. O. CREE

Electrical Engineer  
West Virginia Engineering Co.

(3) The power use or kilowatt hours per ton at the miner or the complete section is shown where the tonnage production was known or could be computed from the distance of advance for the particular coal seam.

(4) The low and average voltages delivered to the miners and a short discussion of the economics of trans-

mitting power with proper delivered voltage to the face.

## Details of Tests

Tests No. 1 and No. 2 are for the same type unit in the same coal seam but at different mines, and these tests were made because of the higher cost of bits for the unit in test No. 2. The data readily show the higher power use of test No. 2 which is attributed to the difference in seam condition.

Test No. 3 is the output record of a 200-kw rectifier for a complete section consisting of miner, two shuttle buggies, roof drill and haulage power

when the locomotive is in the vicinity of this section. The peak kilowatt demands are due to haulage power.

A similar record of another 200-kw rectifier in the same mine, which not only supplied a duplicate miner section, but also a conventional loader section, showed higher average power requirements than in test No. 3 and with more frequent power outages which were reflected in lower tonnage production.

These load tests indicate the conversion capacity for the miner section should be not less than 200 kw.

Tests No. 4 and No. 5 are the average results of several tests which were conducted to determine cutter bit costs. Test No. 4 shows the average data of three shifts of operation under the following varying condi-

Test No. 6 is shown here primarily because of the voltage supply. The low average of 200 v was caused by the small size and length of the power conductors. The shear cut time was never under 40 seconds and was as high as 55 seconds; consequently coal production was low.

Tests 7-A and 7-B are given here to show the difference in power use for dull and sharp bits. The test 7-A is advancing a full face cut 20 ft with dull bits for an average demand of 82.4 kw or 32.47 kwh. The total time of this 20-ft advance was approximately 50 minutes. The 7-B test is for an advance of 30 ft with sharp bits for an average demand of 69 kw or 31.33 kwh. The total time of this advance of 30 ft full face was 54 minutes and less than two-thirds as much

er average power use than for tests No. 7 and No. 8 even with higher average voltage. Due to the higher voltage the test record shows fewer stall periods. No tonnage data was available but from studies of the power charts, the tonnage production should have been slightly higher than for test No. 7 and No. 8.

Tests No. 10 and No. 11 are for the Colmol supplied with 440-v a-c power and also include the power for the 12 BU loader and bridging conveyor or what can be termed a complete section. The No. 10 test is for three operating shifts of this mechanically driven type of unit.

The No. 11 test is for one shift operation of the hydraulically driven type unit. Stall loads were more frequent than for test No. 10, but this is attributed to the low average voltage as this test was purposely made under a condition of maximum transmission distance for 440-v supply.

Test No. 12 is for the Goodman Ripper and is shown in order to make comparisons. The power requirements for the Ripper are lower than for the 1 JCM but higher than for the 3 JCM. The higher kilowatt hours per ton is attributed to an inexperienced operator, as frequent stops were made and coal production was lower than expected.

Tests No. 13 and No. 14 are for the Lee-Norse CM50 unit. This test data was furnished by representatives of the West Penn Power Co. and are included for comparative purposes. The test No. 13 is for only the miner, while test No. 14 is for the complete section consisting of miner, shuttle car, car hoist, and spray water pump for a total of 198 hp in this section.

The average demands are about the same as other miners with peak amperes about the same but lower average amperes at what is evidently an average operating voltage.

## Delivered Voltage

For these power tests all measurements were made at the "nips" and did not include the voltage loss in the

	Shift 1	Shift 2	Shift 3
Average shear time—seconds	20½	15¼	20
Average kw power	107	87.5	87.5

tions of bits: (1) when what was considered dull bits were used on the first shift; (2) new bits on the second shift; and (3), bits that had been sharpened twice on the third shift.

The results were tabulated for average time of each shear cut and average power.

	Type 1	Type 2	Type 3	Type 4
Average shear time—seconds	32.1	27.3	30.82	29.25
Average kw power	74	76	71	71

The favorable results of the shift 2 test indicated to the management the importance of using sharp bits to reduce power requirements and the cost per ton of bits. A decision was reached to replace as many bits as possible at "mid" shift and this was accomplished by overlapping the mechanics' work time in order that two men would be available to change bits during the 30-minute lunch period.

After four types or makes of carbide tipped bits had been used to what was considered 50 percent bit life, time-load tests were made and the results are shown as test No. 5, for average time per shear cut and average power per shear cut.

The type 2 bit is lower in shear time but slightly higher in power. Note the longer shear cut time for these 50 percent life exhausted bits when compared to 15½ seconds for new bits. This longer time was found to be in deeper sumping to an average of 17 in.; while the average sumping in test No. 4 was only 12 in.

The data collected show an average bit cost of 15 cents per ton which included initial cost, labor for sharpening, and labor for bit changes at end and mid shifts.

power use (kwh per ton) was required with the sharp bits as when the dull bits were used.

The importance of sharp bits is readily apparent as a means of saving time and power requirements.

Test No. 8 is for a Colmol when operating at what is considered lower

than normal desirable voltage. Power demands are not as high as tests No. 7 or No. 9 because the inadequate power circuit limits the rate of power use and consequently slows up performance, resulting in lower coal production.

Test No. 9 is in the same mine as test No. 6 for the Joy Miner and it was in a seam which is considered fairly hard cutting for mining machines. The measurements show high-

Results of Load Tests								
Test	Type Unit	Peak	Kw	Amperes		Volts		Kwh per ton
			Average	High	Average	Low	Average	
1	1 JCM	160	108	750	500	205	220	.77
2	1 JCM	200	145	850	600	215	250	1.00
3	1 JCM	330	150	...	...	260	275	1.25
4	3 JCM	145	97.5	700	450	195	220	.93
5	3 JCM	127	73	700	450	200	240	.87
6	3 JCM	122	78	700	430	180	200	
7A	Colmol	165	82.4	820	320	200	220	.986
7B	Colmol	150	69	750	340	200	220	.634
8	Colmol	106	61	500	300	195	215	.824
9	Colmol	138	110	700	500	200	230	
10	Colmol	184	106	...	...	288	430	1.125
11	Colmol	155	100	...	175	300	400	
12	Goodman	125	100	700	450	200	225	1.408
13	L-N 50	126	78	750	263	230	275	.83
14	L-N 50	...	78	1027	276	175	...	1.15

NOTE: Tests 3, 10, 11, and 14 are complete sections.



Low voltage means low coal production; high average voltage will produce desired coal output

trailing cables. Usual practice has been to use trailing cables of 4/0 conductors; consequently, for peak loads of 700 amp there will be 21 v loss in the trailing cable. Also at an average of 400 amp the loss will be 13 v and for an average of 300 amp the loss will be 9 v. The voltage loss in the trailing cables for these particular tests should, therefore, be deducted from the averages shown and when this is done, tests No. 2 and No. 13 show voltage at motor terminals of 237 v and 266 v respectively, while all other tests are lower than the usual 230-v designed voltage.

The design of the "Miners" includes motors to perform a definite rate of work or horsepower. The desired d-c horsepower is the product of speed and torque and of these two principal factors the speed is directly proportional to the d-c voltage applied to the motor terminals and torque in proportion to the current. This brief statement of motor design, therefore, points out the familiar factors of amperes and volts, with d-c voltage being responsible for motor speed, which finally can be stated: "Low voltage equals low coal production; high average voltage—desired coal production." The high average voltage "at the nips" should, therefore, be 250 v.

The economics of providing an average of 250 v when transmitting 800 amp for a 50-v loss (conversion station to produce 300 v) can be expressed as follows. For a distance of 3250 ft, the equivalent copper conductor should be 1,050,000 CM, which would cost installed about \$4 per ft, or \$26,000; but if this circuit is to be extended to 4000 ft, the conductor size must be increased to 1,440,000 CM which at a cost of \$5.13 per ft would be \$41,000.

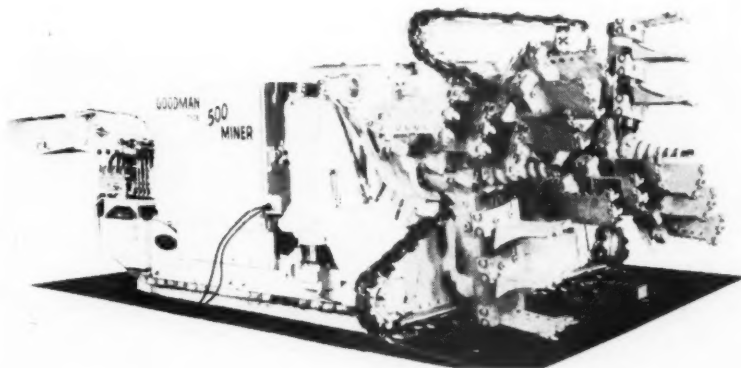
Now when moving a conversion

station there are certain costs for each move that will be the same, such as: new location (underground or surface building), dismantling of unit, moving unit, reinstalling unit. The variable would be the length of the

high tension a-c power circuit. For a distance of 3250 ft the approximate cost per foot is \$4, or the same \$26,000 as for d-c feeder copper; but for 4000 ft because of the constant charge, the cost of the station move drops to \$3.815 per ft, or a total of \$31,000; but the cost of the d-c increases to \$5.13 per foot, or a total of \$41,000; therefore, on an economical basis the conversion stations should be moved at intervals of about 3250 ft.

For the a-c power systems and especially where 1/0 conductors are used for the 500 ft of trailing cable a voltage loss of 4½ per cent will occur for the 175 average current. If capacitors could be installed on the units the operating voltage would be higher.

The design of a-c motors is usually for plus or minus ten percent of voltage, or when a 440-v motor is supplied with only 400 v or lower, it is more likely to stall. The design also includes the torque to vary as the square of the applied voltage and speed is determined by cycles. Therefore, the power system or conductors from the transformers to the unit must not have a voltage loss exceeding ten percent at maximum load. Experience has indicated that the economic



It is important to deliver rated voltage to the machine



Lee-Norse Miner sumps in

distance with three 500,000 CM conductors for a 440-v system is about 3000 ft; or for all practical purposes about the same as a d-c system.

### Conclusion

A delivery of 250 v at the "nips" for the d-c units should be maintained and with transformers producing 480 v the system should not be extended beyond 3000 ft.

### — Discussion —

By C. E. McWHORTER

Mining Engineer  
Goodman Manufacturing Co.

THE TESTS conducted by J. O. Cree indicate the high degree of efficiency that is being obtained in actual power consumed to remove coal from a solid face and load it into a conveyance. This varies from 0.75 to 1.00 kw per ton, which can be considered as  $1\frac{1}{2}$  to 2 cents per ton. If this efficiency was doubled, the saving would be minute enough to have but little effect on the final cost of the coal.

The peak and average currents indicate 150-kw conversion or transformer capacity for the "Miners" and when the full section is considered the minimum should be 200 kw.

The power use from these tests for the unit would vary from 0.75 to 1.00 kwh per ton with the cutting characteristics of the coal seam being the determining factor. For the full section the power use can be expected to vary from 1.00 to 1.25 kwh per ton.

However, Cree in discussing cutter bit performance gives us data that points to very real savings if particular attention is paid to keeping sharp bits in the machines. Test No. 4 shows that the machine actually mines coal 20 percent faster with sharp bits as against "half worn" bits. With seven men charged to the Miner section, and an assumed shift production of 300 tons with worn bits, the saving in direct labor would approximate nine cents per ton or an additional 60 tons per shift. Experience has shown that sharp bits can be kept in the miner without using time that the machine would normally be operating, if the operator is alerted to take ad-

vantage of general delay periods not caused by the failure of the machine itself.

The paper by Cree illustrates the absolute necessity of maintaining 250 at the "nips" for efficient Miner production. It is also shown that the maximum distance from conversion station to the nips should be 3250 ft and that to go 4000 ft or 750 ft farther requires 390,000 CM extra copper in the power line at an additional installed cost of \$15,000. In a five-ft seam, there will be only 150,000 tons of recoverable coal made available by this extra 750 ft of power line, so the penalty would amount to ten cents per ton less a very small amount — perhaps three cents for moving the converter a little more frequently.

### Advantages of AC Equipment

Cree's report concerns experience with mostly d-c machines operating at near 230 v at the motor terminals—which is the voltage that the motors are usually designed for. It is interesting, and might be well, to consider alternating current at 440 v for this application. One good thing favoring a-c motors is that if the voltage drops as little as ten percent, the motors will stall. While this has most always been considered one of the main disadvantages of a-c power, it could well be used to advantage if properly understood and handled. With alternating current, the voltage must be maintained or the machine will not run. The d-c machines will run at greatly reduced voltage, but when they do, the damage to them becomes extremely expensive, both from the standpoint of reduced productivity of the miner because of reduced speed, and from excessive maintenance of the motors because of damage from heat and arcing. Cree points out that the cost of power transmission cables for 440 a-c is equivalent to 230 d-c for efficient operation of either type. However, the cost of purchasing and installing rectifiers or M-G sets for d-c conversion is many times more than transformers for a-c. Related distribution equipment and switch gear is also much more expensive for direct current and the cost of its maintenance is several times higher. Electric control equipment on the Miner is much more complicated for direct current, also its maintenance is bound to be higher.

We should carefully weigh the potential savings that ought to result from operating face equipment with alternating current. There are many forward thinking mine operators opening up new mines with a-c power supply throughout. The indicated economies are such that the trend in this direction is well established, although as yet it is on a relatively small scale.



The potential savings that ought to result from operating face equipment with alternating current should be carefully weighed

# Mechanized Mining at Mi Vida

**A conducted tour of a uranium mine through pictures of the equipment used in the operation**

By **VIRGIL BILYEU**

Mine Superintendent  
Utex Exploration Co.

WHEN speaking of the plateau it is generally understood to mean the uranium producing area of the four corners of the states of Utah, Colorado, New Mexico and Arizona. Therefore, this discussion will be limited to the uranium mines, and since we of Utex Exploration Co. believe our Mi Vida mine to be one of the most mechanized underground mines on the plateau, will dwell mainly on our equipment and mining procedure.

The Mi Vida has had successful experience with rubber-tired diesel haulage equipment, front end diesel tractor loaders and tractor-mounted jumbos. However, the decision has been made to develop a low level haulage and draw hole system for future mining of the ore body. Gismos will load and move the ore to draw holes connecting with an electro-powered track haulage system driven below the ore body.



**SURFACE INSTALLATION**

Surface installations at the Mi Vida mine include bunkhouses, dining room, office, shop, power plant and compressor house.

The two modern cement block bunkhouses in the upper right accommodate 24 men each. Each building is divided into 12 sleeping rooms and a spacious lounge. The top right building is the boarding house where the entire crew eat. In the lower left is shown the headframe where the first ore was mined from the orebody 75 ft below the surface. A few feet north of the shaft is the location of the drill hole that led to the discovery of uranium ore in the Big Indian district.



**TOPOGRAPHY**

This is a typical topographic scene of the Big Indian mining district in southeastern Utah. Note the massive sandstone formations and next the alternate layers of sandstone and shale beds, all of which overlie the ore horizon. In this area water is nearly as valuable as the uranium ore produced.

(Below). The airleg is a common sight around any mine, particularly where the openings are correspondingly small.

Note in the picture the size of the drifts as compared to the man and airleg. Utex has found the airleg to be impractical in these larger headings and developed a jumbo that will drill them with one pass. One jumbo will produce as much as six airlegs.



**AIRLEG**



JUMBO

→ Loading holes in all mines is quite similar. Here the company uses the spare front end loader for transporting the powder and for greater ease in reaching the high holes.

The powder is DuPont Extra A of 55 percent strength and a velocity of 10,000 fpm. We are using a 1 1/4 in. diam stick, 24 in. long. This long powder has cut the loading time from six man hours using the regular eight in. stick to two man hours.

All blasting is done with DuPont electric milli-second caps, which has decreased the powder consumption and increased the fragmentation. The AEC has a stipulation in circular 5 that all boulders be less than 12 in. This means more holes and more powder to keep the boulders down to size.

Two men load all the rounds to be blasted each day beside doing other maintenance work.



FAN

→ As a further advance in mechanization we are introducing into the Mi Vida Mine the Gismo system of mining. Proven advantages of this system are in greater tons per man shift, less equipment to maintain and reduced headroom requirement. This will permit greater mechanization in small ore bodies.

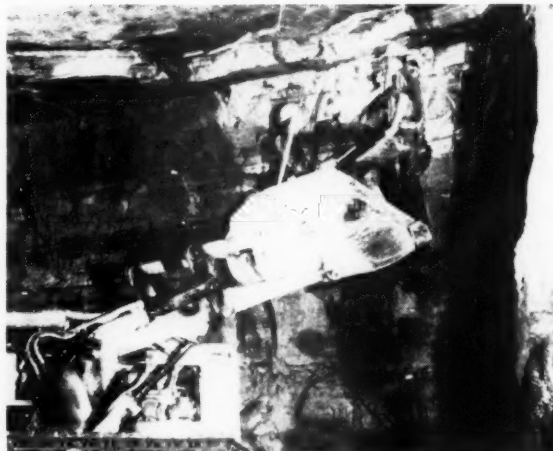
In the photograph is shown a jumbo built on a loading Gismo chassis. It is similar to the tractor mounted jumbo except this must be pushed into place by the tractor.

←

This jumbo was assembled in the mine shop at Mi Vida according to our own specifications. The drills, shell and jibs were purchased from Ingersoll-Rand and mounted on International TD-9 tractor. All controls necessary for drilling are grouped directly behind the boom for better visibility. This is where the operator sits to perform his duties. The drills are three in. drifters on a chain feed mounting which will accommodate a 12 ft steel. This steel has a one-in. hexagonal section and is threaded for bits. Tungsten carbide bits averaging 1200 ft per bit are used.

The mine has two of these jumbos, both of which drill continuously for the entire shift.

The tractor size can be used as a guide to visualize the size of the drift. Note the roof bolts near the drift face. These two men will drill out two 100 hole faces per eight hour shift. The hole pattern is a standard vertical Vee cut with a baby Vee as relievers and to reduce the boulder size from the cut.



LOADING HOLES

←

With diesel equipment underground the ventilation requirements are quite high. Also, the radon gas that is being continuously emitted from the uranium ore must be kept to a minimum with forced ventilation. The fan pictured is a Joy, series 1000 Axivane blower producing a maximum of 120,000 cfm.



GISMO JUMBO



LOADING ORE

→ This roof bolting machine was built at Utex. The tractor is a TD9 International with a Bucyrus-Erie attachment. The cage replaces the standard bucket and is operated from the bucket controls. Since hydraulic cylinders have a tendency to leak off over a short period of time, an adjustable stiff leg on the cage has been added to hold the desired height. An average of 1000 six ft bolts are driven each month using this piece of equipment. Conventional stopper and impact wrench are used for drilling holes and setting the one-in. wedge type bolts. Where the shale back is exposed, either army surplus landing mats or wooden headboards are used to increase the bearing area of each bolt.

← Mucking and transporting equipment in action—a Caterpillar D6 front end loader filling a Koehring Dumptor. The Cat bucket has a capacity of two yd and the Dumptor will haul nine tons. An HD5 Allis-Chalmers is used for the smaller drifts. The Dumptors require an opening 11 by 11 ft in the clear and can negotiate grades up to 24 percent.

Our mucking units consist of two Dumptors and one front end loader with one of each as spares. On a two-shift basis and a five-day week this unit has consistently produced over 20,000 tons per month. The muck crew consists of one loader operator and two Dumptor operators on each shift.

Each piece of diesel equipment operated underground has an exhaust gas water type scrubber.



ROOF BOLTING



GISMO MUCKING UNIT

→ This is the string of cars which will haul the muck from the raises to the ore bin. They are bottom dump with a capacity of eight tons each.

Note the side rails where the tractor and Gismo transport travel when loading the cars and for transporting to the face.

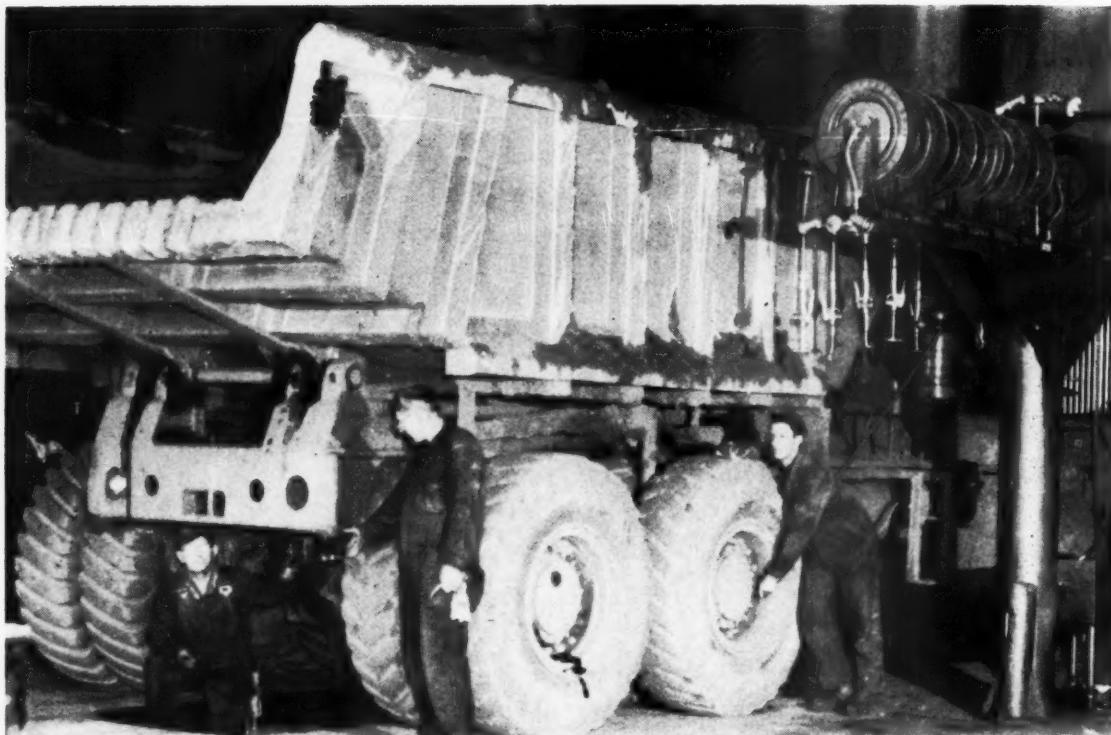
← For driving the haulage drifts and later for mining in the stopes, the Gismo will be used. It is a self loading and transporting unit holding approximately six tons. The power for pushing and bucket control is supplied by an Allis-Chalmers tractor.

Note in the picture how the bucket is hinged to the unit and activated by the tractor winch and cable. Each dipperful is thrown to the back of the unit by simply raising the bucket to a near vertical position.

By manually operating the side latches, the cable opens the bottom sliding doors allowing the muck to fall out. It is designed for dumping into raises but can be used for backfilling and spreading.



Ore Train



An interesting feature in this preventive maintenance bay is that all the old oils are picked up, filtered and fed into the boiler room for general plant heating

# Preventive Maintenance For Mobile Equipment

By GORDON EDWARDS  
Mechanical Superintendent  
Steep Rock Mines, Ltd.

STEEP Rock Iron Mines is situated on the shores of what was once Steep Rock Lake, in the bed of which all of the Steep Rock ore deposits are located. The mine lies some four miles north of Atikokan, Ontario, a divisional point on the south line of the Canadian National Railways, 140 miles west of the Lakehead cities of Port Arthur and Fort William.

By building a series of dams and cuts, the Seine River that flowed through Steep Rock Lake was diverted and the lake pumped dry by using a battery of 14 electrically driven 24-in. centrifugal pumps. The lake-bottom silt and underlying boulder clay was removed by dredge and truck. Ore production began in 1945,

and it is with the equipment used for that purpose this paper is concerned.

## Safety and Planning

Preventive maintenance is the safety program of equipment. On the one hand, we train and plan to have men perform their work in an orderly, safe way and take every precaution to see that they do not harm or injure themselves. On the other hand, surely we can apply this prevention of injury to workmen in the same manner to the prevention of damage by carelessness, neglect or improper techniques in the operation or repair of a fleet of vehicles. At least, that is what we have found in actual practice.

It is this author's belief that a preventive maintenance program must be molded and developed to fit one's particular equipment and requirements, and planned to fit the particular operation. In discussing how such a program was developed for a large Canadian iron ore producer, he covers such varied topics as the importance of manpower, service records, material handling and the I.B.M. record system

• • •

Many of us have seen a house that has been painted without rhyme or reason. In other words, someone thought the paint looked a nice color, so they bought it and put it on without consideration to planning, harmony or other factors.

It seems to me that in so many cases preventive maintenance pro-

grams fall down due to this same reason and not just because:

- (1) They are difficult to set up.
- (2) There is too much paper work.
- (3) They just fizzle out.

They lack the basic fundamental principles of planning in the first place, like in painting the home. I believe too, that management is quite often led into believing (by probably well-meaning manufacturers and others) that preventive maintenance is a simple matter of filling in a few forms and only lacks the effort of the individual to put into practice.

I have at hand this moment a service recommendation from a well-known manufacturer that compares the individual's attention to his home, car or shotgun in relation to a fleet of trucks. It describes nine different check sheets and ends up by advising us that paper work is limited to a few minutes a day. Can we believe it? Must it not take more effort than that? Every credit should be given, of course, that it is a program, and if it could be applied it is certainly better than none—or better than some that exist only in name.

I don't believe you can get a preventive maintenance program tailored and off-the shelf. It must be molded and shaped and developed to fit one's particular equipment and requirements, and planned to fit one's needs and operations.

### Sets Up Program

In planning our additions and improvements to what in 1950 was our system of preventive maintenance, we set out to determine our objectives, which were the ability to:

- (1) Handle more vehicles.
- (2) Increase efficiency.

(3) Maintain costs against increasing prices.

(4) Gain closer control.

(5) Break down work detail for untrained men.

This had been necessary due to the increasing development of the mine and the demand for more service trucks, more tractors and a change-over from 15-ton to 22-ton trucks. Consideration had to be given also to fitting of the work program into the established buildings. The shops at that time were poorly lit, unpainted and had been designed to handle 15-ton trucks only.

Due to our isolation at the time, the shortage of skilled labor, and the demands of other industry, labor was hard to obtain. While this added to the problem, it proved the need for greater control and the setting up of procedures and practices.

Our next step was to seek the facts available in order to lay down procedures and as far as possible to estimate the immeasurable factors.

We wrote to other operating mines with similar equipment; to transportation companies; and to the equipment manufacturers asking for samples of their system of control and maintenance.

Manufacturers of various types of shop equipment were also sounded out for types, details and cost.

Consultations were held with our engineering department on installation detail, our electrical department on lighting requirements, and painting engineers for advice on the value and use of color dynamics.

At this point we might observe that we have been slow to estimate the power and use of color. I don't mean just painting, but the use of energy

### About the Author



GORDON EDWARDS was educated at North Rosedale School, Toronto Technical School and Standard Engineering Institute.

After an apprenticeship in Toronto, he went to England early in 1938 to work for Geo. Wimpy and Co., Ltd., General Construction and Civil Engineering, London, England, as senior inspector (field mechanical superintendent). Throughout the war years, his time was spent on a wide variety of machinery covering the construction of naval bases, aerodromes, balloon barrages, gun sites, docks, factories, home sites and finally open pit mining with the Open Cast Coal Division.

Returning to Canada in 1946, Edwards became mechanical superintendent with National Quarries in Montreal, covering various aspects of its rather large operation; then moved to Toronto in the same capacity with Dufferin Construction and its various associated companies.

In 1948-49 he joined the staff of Steep Rock Iron Mines, Steep Rock Lake, Ontario, as mechanical superintendent.



When allocated work by his foreman, the mechanic punches the clock, goes out and does the job. He then fills in the unit number and the code for the work. This is taken from an easily read tabulated list beside the clock. When the job is finished, he punches off

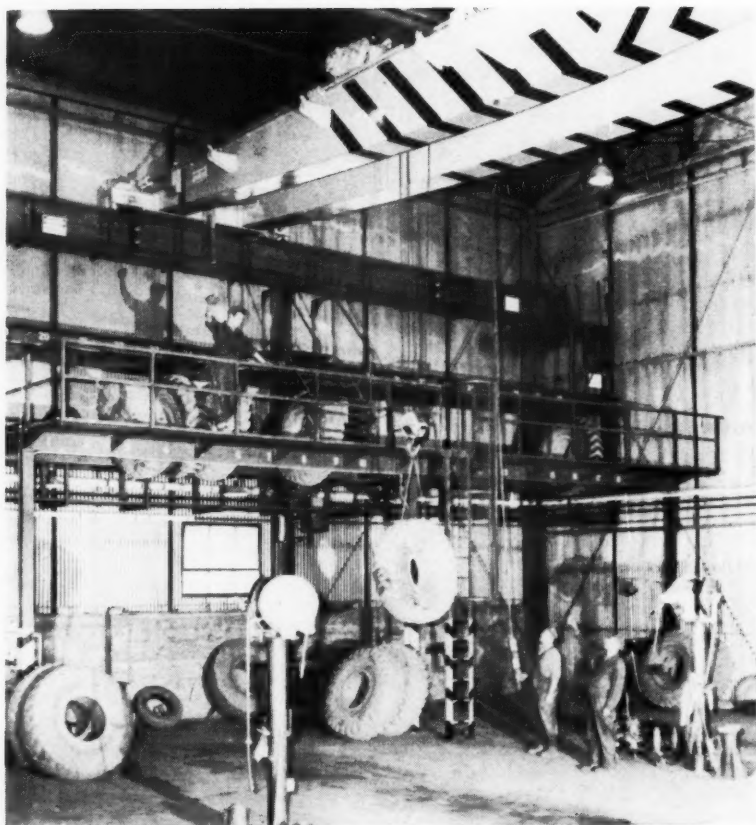
in color and the science of its use to humanity. The proper application of color codes to piping is important—red to fire apparatus, yellow to moving parts and orange to electrical. The use of related color values to light, health and sight certainly is too good a point to miss for safety if one wants full value from paint.

In conjunction with shop foremen, we then produced a shop layout giving us the basic detail of what would take place in each bay; the estimated time cycle and the estimated men required to make the best use of the space and equipment available.

### Reaction of Personnel

Several obvious questions arose. Would it work? What would the employees reaction be to a timed and closely-controlled operation? To what extent would other departments co-operate? What would the shop supervision reaction be? To what extent would cycle lags occur?

Here was a selling job to be done



Hoisting a tire with a five-ton crane at the tire bay

in each case. We explained the program and our reasons to all shop employees and asked for suggestions and recommendations. We discovered the average man prefers things organized to haphazardness, and the more so if his opinion has been asked or his idea used.

Departmental cooperation was fostered by the same method. Working with department heads keeps cycle lags down to a minimum, so that production and maintenance can live in harmony.

Supervisory reaction was 100 percent for it only needed the start of the program to get whole-hearted effort. To them it was the call to action, the end of groping in the dark, and the beginning of a new era.

Now came the time to lay out the work in relation to our capacity and space; to work out time cycles suitable to all departments and to coordinate the other work of our department with the program. Equipment installation, lights and painting could then be outlined along with procedure analysis of job instruction, reports and records.

### Importance of Manpower

We were now in a position to plan the work and decide how it was to be done by setting up estimates for:

- (1) Service personnel
  - (2) Service records, size, colors and detail
  - (3) Clerical personnel and office records
- Service Personnel were broken down into four more groups:
- (a) Types of men
  - (b) Grades of men
  - (c) Number of men
  - (d) Training or experience status.

Since nothing is accomplished except through the efforts of men, let's take a look at the subject of manpower.

The question arises at times about what we mean by types of men. Since men are all individuals and important people, it is in the interests of smoother efficient operation that a man should work at the section or phase he wants to work at, and also at what he can do best. We have one type who wants to do nothing but service trucks. He has been doing it for 20 years and wants to do nothing else. We watch for that type and place them accordingly.

There are limitations to the way you can move men about. Openings aren't always there within a limited group. A man is a pretty important person, and what he wants to do is important. Before a refusal, look at it again and evaluate the individual—he may just be the key to the group one day.

A grade of man is related to his status as first or second class mechanic, and then in relation to the number of men that our analysis indicates is required; and lastly, training or experience status governs a man's potentiality to be up-graded. It is also in the interest of efficient operations that the more experienced man be graded and placed where this knowledge and ability would do the most good.

### Scope of Training

Instructional training was arranged on the job in conjunction with our safety and training engineer and manufacturer's representatives. These were highly-organized schools with main component truck parts mounted on portable tables and wheels. They could be dismantled and re-assembled for instruction. Wide use was made of slides and motion pictures.

Parts books, instruction books and general engineering literature were made available through distribution in the shops and by a library setup in the shops themselves.

A regular program of visits from equipment service personnel related to the various types of equipment was set up, and on their visits to the mine, they were allowed to work and circulate freely among the men and so pass on their wider knowledge.

A regular program of sending a number of men to the manufacturers plant each year was not only beneficial in a technical sense, but also the psychology of getting away from the mine for a trip gave a lift to the man and the rest of the mechanics and proved to be worth a fortune.

A new mine, a new town, a young man starting out into life, inexperienced perhaps as far as the equipment is concerned, eager to learn and willing to be instructed. What an opportunity to put to work all the safe practices we speak so much of! Given the opportunity of studying the instruction books related to one's equipment, the benefits of on-the-job training, and finally including going to the factory for special training. Proud? Of course he's proud! And he will work his head off to do the job the way you want it done. Certainly better training reflects in better thinking and proper attitudes.

Every opportunity should be given personnel to speak to service men. Those men, generally specializing in one type of equipment, are experts, and it has been my experience that they know what they are talking about. They should be encouraged to visit your site so that their full knowledge can be put to work among your mechanics.

### Simplify Service Records

Service records are an important function but they should be simple in detail. Instruction should be straight-

forward, in good sized print, easy to read, with writing kept to the minimum so the mechanic just has to "tick it off." Color is important, so it should be made attractive and easily spotted. Size, we feel, is also important as nothing is more annoying than small pads of paper with practically no room for comments. Details on the sheets were based on the information we had collected, on the experience and wide knowledge taken from our men and supervision.

### Clerical Personnel

Clerical personnel had to be adequate to handle the recorded details from various sheets and remind line supervisors of service check periods due on units. These were taken from hourly records of our operation on any particular unit. We felt this phase was important as it developed office records which gave supervision the opportunities to develop new methods and prevent hindrance to scheduling.

While we are discussing clerical personnel, let's just clear up a couple of points. The first is perhaps a little touchy. The mechanic is at home in the shop, and the stains and grease on his hands and clothes are the marks of his trade; it's not dirt to him. However, when he has occasion to visit the mechanical office for any purpose, he is out of his element and he will generally show it. Your clerical staff should be aware of his uneasiness and treat him like the skilled worker he is.

And here's the other point—while it is essential not to over-complicate office records, there is the other extreme of not having sufficient detail. Experience and forethought are still the best teachers as to what and how detailed a record should be. A concise yet simplified system will enable the clerical staff to avoid bogging down in paper work and prevent them from getting to the practical side—the nuts and bolts. We could end up with the finest records in the country and not have a truck running. On the other hand, some mechanics would have us wrap the equipment up in cellophane at the expense of production. It's quite clear that there must be a middle line.

### Material Handling

Materials such as spare parts, oils, grease, etc., are difficult to catalogue due to their varying weights and sizes, so considerable thought was given to safe handling and disposition of them. Also, the harmful qualities of certain oils and greases was not overlooked.

In order to ensure adequate availability of spare parts we followed a program previously set up in our stores by continuing to use a maximum and minimum system based according to the number or amount

used. We found this very satisfactory if regularly revised, but if not revised it tends to leave parts on the shelf unused for an indefinite period.

In order to handle the various heavy parts from the stores to the shop, it was necessary to equip a truck with modern crane equipment, while a smaller truck was made available for incidental parts.

Oils and greases are stored in containers placed under the service floor and fed to the equipment by air-driven pumps, with the main source of material supply being the warehouse. This practically eliminates personal contact either when filling or disposing.

### Housekeeping

With the arrival of a spare part in the stores and the issuing of it for use, the majority of people forget that it also replaces a broken or worn-out part. The handling of these parts can be, in itself, a major problem, and definitely reflects on housekeeping if not taken into consideration and attended to. Certainly nothing could

were working with the correct tools, that our equipment was adequate, and that proper methods were being used.

We are forced to admit that our system is not fool-proof. For example, one review showed that our jacks were inadequate and being improperly used. What did we do? We called in our safety engineer who made a study and produced a booklet on the approved uses for jacks. This simple little booklet told you the make, capacity, lift, height, the handle length, where used and general safe practice. The results of this booklet were that we continued to get the best and safest use we could out of the jacks we had until we replaced them with a more adequate type. We budgeted for more lifting tackle and precision tools according to our needs and spread over a period of time.

Our work record indicated that we did have repeating jobs due to the wrong procedure being followed. On these we made a breakdown by recording every detail of the entire method, then checked into each and eliminated the undesirable. We succeeded in pre-



In order to handle the various heavy parts from the stores to the shop, it was necessary for the company to equip a truck with modern crane equipment

be more unsafe than wornout parts piled up in the shop, and they quite often become a rust heap at the side of the building or outside of the door.

In our case, we use five large metal containers that are spaced outside the shop. These containers have large lifting handles and are emptied regularly by use of the crane truck. This keeps the shop area clean and tidy. Salvageable parts are delivered by hand cart to the welding or machine shop for repairs.

### Reviewing the Plan

As the work progressed it was found necessary to review the plan and develop new methods and procedures with changing times and equipment, and to see that personnel

venting such things as a plate going to the machine shop for resurfacing and allowing the machinist to set it up improperly, or permit a mechanic to fit a plate to the truck wheel without taking off the rough edges with a file. But by the mere fact that such improper practices did show up clearly indicated that they can also be brought under control and corrected.

### Continuous Development

Our final control check is being developed continuously by a system of records on the I.B.M. (International Business Machines) so that all loopholes will eventually be plugged. Under this system we record the day,

*(Continued on page 75)*



The Mansfield Colliery coal preparation plant

# A Modern English Coal Preparation Plant

The National Coal Board in the United Kingdom is engaged in a broad program to extend coal washing capacity in order to improve the quality of the product marketed. From 1947 to 1954, nearly 140 washeries have been built or extended, giving an additional annual capacity of 40,000,000 tons. Another 65 plants are under construction or planned to give a further 40,000,000 tons annual capacity. To illustrate the Coal Board's project, the editors of Mining Congress Journal arranged for this story of the Mansfield Colliery's new modern preparation plant.

By B. A. PRICE

Fraser & Chalmers Engineering Works  
The General Electric Co., Ltd.

COAL MINES, by expanding production and utilizing more mining machinery, are increasing the amount of fine coal in the run-of-mine product. Cleaning and drying this coal presents difficult problems.

Mansfield Colliery, situated in the No. 3 area of the East Midlands Division of the National Coal Board, faced this problem when they decided to develop a new seam. After a careful study of the various methods available for handling run-of-mine coal, the company decided to build a new preparation plant utilizing the Chance sand flotation process to clean the plus  $\frac{1}{16}$  in. sq size and the froth flotation method for the minus  $\frac{1}{16}$  in. sq.

## Site Details

The two shafts of the Mansfield Colliery were sunk at the beginning of the present century and for many years the Top Hard Seam was worked from this colliery. The coal preparation facilities included a jig washery for washing sizes from four to one in. and a trough washer for dealing with 1 in. by 0 fraction, while sizes above four in. were hand cleaned on picking belts before being loaded into railroad cars.

Toward the end of the Second World War, it was decided that the High Hazel Seam would be developed and worked from Mansfield, since the Top

Hard Seam was rapidly being worked out. This changeover resulted in a large scale reorganization underground, and it was decided to abolish cages and to utilize skips in the No. 2 or coal hoisting shaft. Mine cars and diesel locomotives were installed underground, but the cages were retained in the No. 1 shaft to handle refuse, men and materials. In an emergency, however, coal can be brought to the surface by this means and a Lofco plant has been installed for dumping the mine cars.

While these developments were taking place underground many important changes, which included the conversion from steam to electric hoisting, the provision of new administrative offices, workshops, and a modern coal preparation plant, were being planned and carried out on the surface. The latter was to replace the two existing plants which had completed their useful life, and more particularly, to replace costly and inefficient hand cleaning.

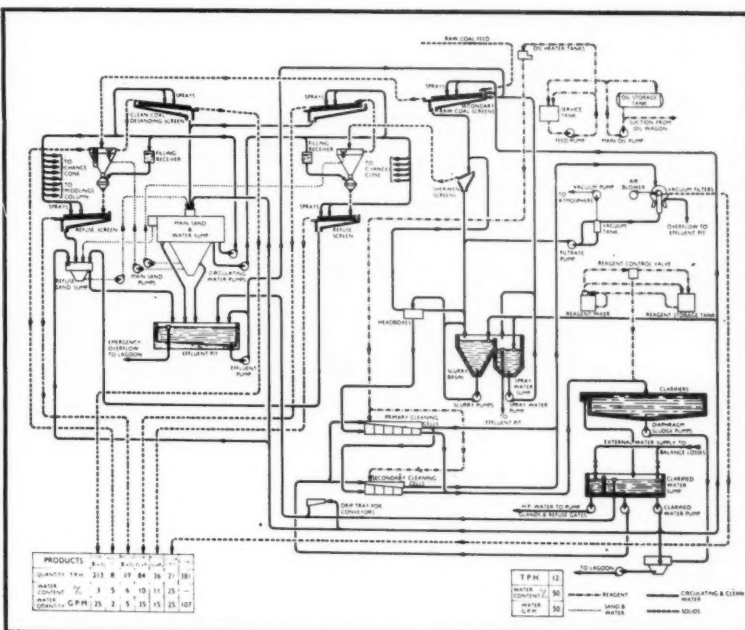
After much investigation of the various processes available for dealing with the run-of-mine coal, it was decided that the equipment manufactured by Fraser & Chalmers Engineering Works of the General Electric Co., Ltd., would be suitable for the conditions and a contract was subsequently placed for a plant in which the whole of the output, amounting to approximately 400 tph, would be cleaned by two processes; namely, the Chance for sizes above  $\frac{1}{16}$  in. sq and froth flotation for the sizes below, in the manner already described. It is believed that the Mansfield plant is

unique in that it is the first plant in the world to be installed where the whole of a pit output is cleaned in a combination of a heavy medium-froth flotation process. It is interesting to note that since this plant was ordered three further plants of similar capacity have been ordered by the N. C. B.

The construction of the plant at Mansfield presented many difficulties as the existing washeries and hand-cleaning section had to be kept in commission during the constructional period of the new plant. The new clean coal screening and loading section had, in fact, to be built on top of the old equipment and the various picking belts replaced by boom loaders, one by one, on the week ends. During this changeover the hinged jibs of the boom loaders were propped up and used temporarily as picking belts until the new plant was commissioned.

## Two Chance Cones Installed

Numerous examinations of the raw coal were carried out before the contract for the plant was placed and, from a study of results, it became apparent that the various products required could best be obtained by installing two Chance cones for dealing with the coals above  $\frac{1}{16}$  in. in size. The reason for this decision was that the sizes above  $\frac{1}{2}$  in. rd contained a certain proportion of intergrown middlings which could be improved upon crushing, whereas it was not considered worthwhile to produce middlings in the  $\frac{1}{2}$  in. rd by  $\frac{1}{16}$  in. sq fraction, where a higher ash content was permissible. Consequently, one 14 ft. 0 in. diam. Chance cone was installed, with middlings extraction equipment, for dealing with the plus  $\frac{1}{2}$  in. size, and a second cone of the same diameter was included for dealing with the



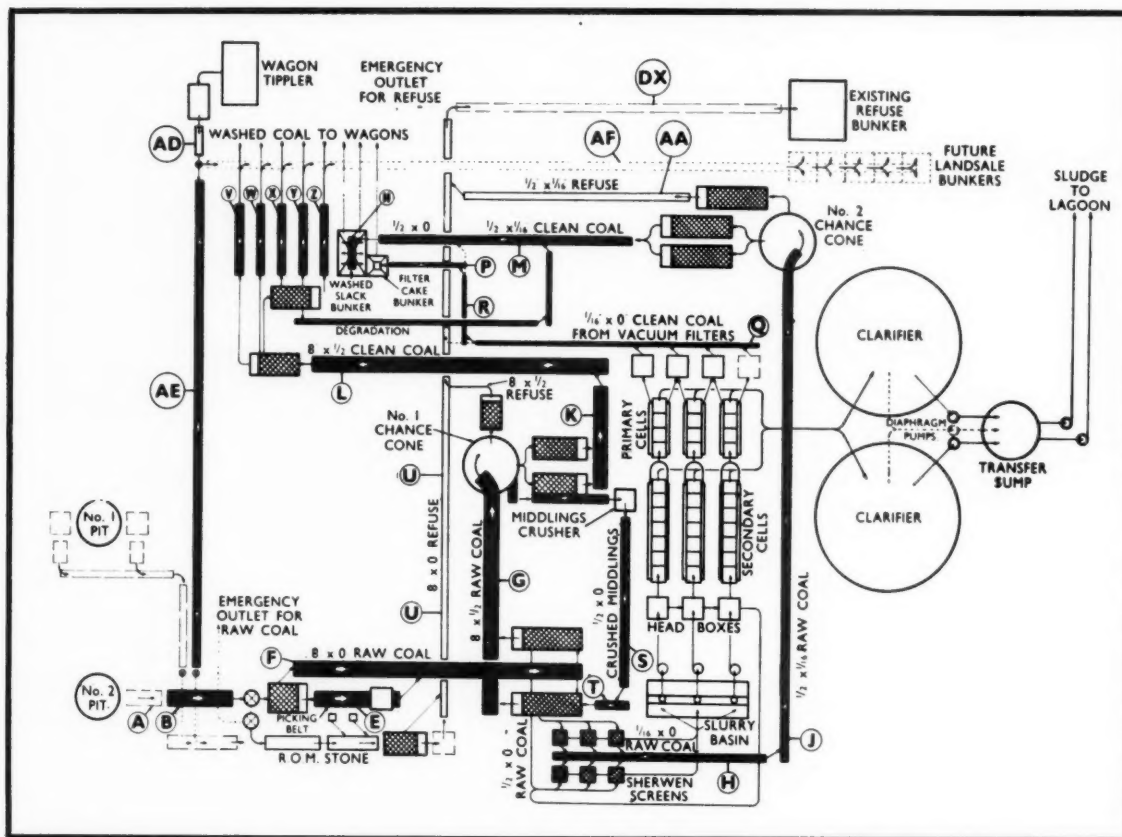


Fig. 2—Water flow diagram

aration at eight in. From this screen the 8 in. by 0 fraction passes directly to conveyor F, while the plus eight in. size is fed on to picking belt E. The latter is used for the removal of any exceptionally large pieces of refuse, plus other extraneous material, and is fitted at its discharge end with a Plowright Pick breaker to reduce the plus eight-in. coal to minus eight in. This broken coal then joins the "natural" 8 in. by 0 product on conveyor F for delivery to the main section of the coal preparation plant.

Facilities are also included on the picking belt whereby a special hand picked selected large coal can be delivered directly to railroad cars when required.

Conveyor F delivers the 8 in. by 0 raw coal onto the two secondary raw coal screens screening at  $\frac{1}{2}$  in. rd, the 8 by  $\frac{1}{2}$  in. fraction being delivered to the No. 1 Chance cone via conveyor G. The  $\frac{1}{2}$  in. by 0 fraction, together with all the spray water, is laundered to a battery of six Sherwen electromagnetically vibrated screens where a separation by means of wet screening takes place at  $\frac{1}{16}$  in. sq. It is interesting to note that the separation takes place in the first 12 to 15 in.

The  $\frac{1}{16}$  in. by 0 fraction, separated on the Sherwen screens, is laundered to a slurry basin and then pumped to the flotation plant, while the  $\frac{1}{2}$  by  $\frac{1}{16}$

in. fraction is delivered to the No. 2 Chance cone via conveyors H and J.

The No. 1 Chance cone, as previously mentioned, is arranged for a three product separation, namely clean coal, middlings and refuse. The latter, after desanding and dewatering, is delivered onto conveyor U and then to an existing 200-ton aerial ropeway bunker via conveyor DX.

Meanwhile the clean coal from the No. 1 Chance cone is laundered onto a pair of clean coal desanding and dewatering screens, then delivered via conveyors K and L to the sizing screens. The latter separate the 8 in. rd by  $\frac{1}{2}$  in. rd clean coal into 8 by 4 in., 4 by 2 in., 2 by 1 in. and 1 by  $\frac{1}{2}$  in., for loading into railroad cars via boom loaders V, W, X and Z, respectively. A spare boom loader Y has been provided so that the number and range of the sizes may be altered to accommodate changes in the market requirements.

The 8 by  $\frac{1}{2}$  in. middlings fraction extracted from the No. 1 Chance cone, by means of the middlings column, is desanded and dewatered on a section partitioned off on one of the clean coal desanding and dewatering screens. This material is then crushed to minus  $\frac{1}{2}$  in. in an F. & C. Pennsylvania hammer mill, and returned to the secondary raw coal screens via conveyors S and T for separation into  $\frac{1}{2}$  by  $\frac{1}{16}$

in. and  $\frac{1}{16}$  in. by 0, along with the raw coal feed, for delivery to the No. 2 Chance cone and to the flotation plant, respectively.

The No. 2 Chance cone is arranged for a two product separation only and the refuse, after desanding and dewatering, is delivered to the aerial ropeway bunker via conveyors AA, U and DX. The clean coal is desanded and dewatered on a further pair of shaker type screens and delivered to a 300-ton capacity loading bunker via conveyors M and N.

Meanwhile the  $\frac{1}{16}$  in. by 0 raw coal, which passes into the slurry basin as already explained, is pumped to the flotation plant via the head boxes, whose function is to remove any oversize material in the feed and to control the quantity of slurry delivered to the flotation cells. The slurry from the head boxes passes to the three banks of primary cells, each bank consisting of seven cells. The concentrates from these cells may pass either directly to the three 200 sq ft Unifloc rotary vacuum filters, or alternatively, they may be retreated in a set of three banks of secondary cells, each bank consisting, in this case, of four cells. At the time of writing it has been found possible to clean the  $\frac{1}{16}$  in. by 0 satisfactorily in the primary cells without using the secondary cells. The tailings product from the primary

cells and from the secondary cells is laundered to two 75 ft 0 in. diam Unifloc clarifiers.

After dewatering on the rotary vacuum filters, the filter cake is discharged onto conveyor Q and then to conveyor R. The latter is arranged with an adjustable chute so that the filter cake may be mixed with the washed slack on conveyor M, or alternatively, loaded into railroad cars separately via conveyor P and a filter case bunker. Provision has been made to permit installation of a further vacuum filter in the future if the amount of fines increases.

As explained, the tailings from the cells pass into two 75 ft 0 in. Unifloc clarifiers from which the clarified water overflows into a sump for reuse in the washery, while the thickened sludge is extracted from the bottom by means of two diaphragm pumps. These discharge into a transfer sump, from which two F. & C. centrifugal sand pumps deliver the material a distance of over 800 yd to a lagoon. It is a notable feature that, due to the coarse size of the tailings, the solid material settles out remarkably quickly in the lagoon; to such an extent in fact that it is possible to pump the water back to the washery and thereby maintain a closed circuit.

Experiments are now being carried out with both rotary vacuum filters and filter presses so that the tailings may be dewatered and sent to the dump along with the washery refuse.

## Water Circuit

The two-process combination of washing results in a very simple water circuit. Water is added on the secondary raw coal screens, for extracting the minus  $\frac{1}{2}$  in., and this fraction together with all the spray water is laundered to the Sherwen screens for a further separation at  $\frac{1}{16}$  in.

A small quantity of water is continuously bled from the Chance circuit to keep the solid concentration to a satisfactory level, and this effluent is used to assist the wet screening. The balance of the spray water is provided by the clarified water pump. After it has been separated on the Sherwen screens, the  $\frac{1}{16}$  in. by 0 fraction passes to the slurry basin, whose function is to even-out the washing characteristics and solid concentration of the feed to the flotation cells.

The arrangement of the water circuit ensures that the fine material is extracted from the feed immediately upon entering the plant, thereby avoiding a considerable measure of degradation as recirculation is avoided.

All conveyors handling wet or sticky materials are provided with special collecting troughs for spillage under the return side of the belt. These troughs are continuously flushed with water which is drained either to the slurry basin or effluent pit. The solids are, of course, recovered in the flotation plant.

The plant operates with a completely closed water circuit, the only

make-up water required being that to replace the moisture loss with the various products.

## Provisions for Waste

In addition to the equipment for cleaning the raw coal, the plant includes facilities for dealing with refuse. The rock may be brought up either of the two shafts and after passing over a steel plate picking belt, for the removal of any free coal, it is screened at eight in., the plus eight-in. fraction being reduced to minus eight in. in a jaw crusher. The whole of the 8 in. by 0 reject is then discharged onto the rubbish conveyor U and then to the 200-ton aerial ropeway bunker. Hoisting of the slate usually takes place off shift, but it is possible to handle it while hoisting coal.

## Local Sales

Provision has been made whereby in the future the hinged jibs of the loading booms may be lifted up and discharged onto conveyor AF, so that any of the washed coal sizes may be loaded for local consumption.

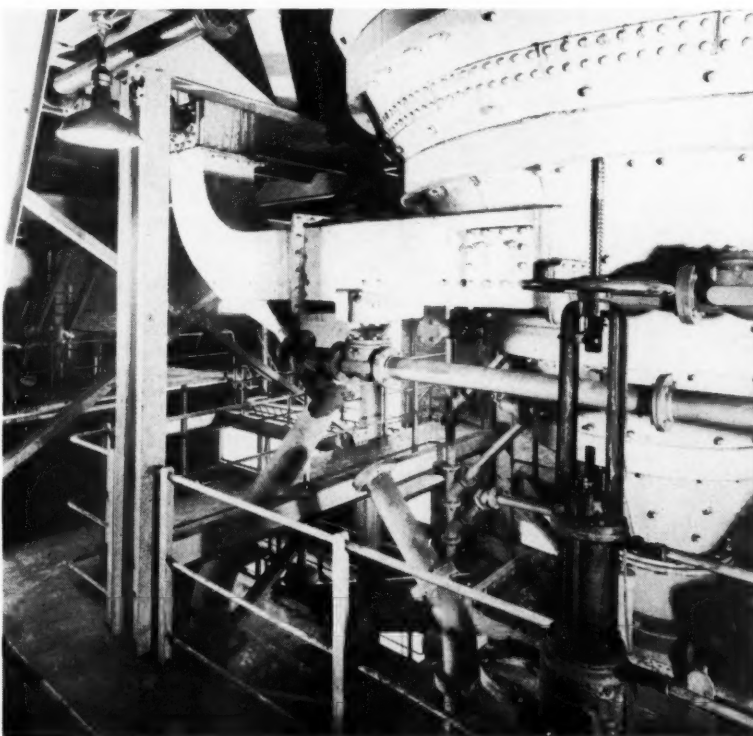
## Emergency Arrangements

The rubbish disposal facilities include arrangements at the discharge end of conveyor U whereby rubbish may be loaded into railroad cars in the event of the ropeway being out of commission. Other emergency measures include facilities for bringing coal or dirt up either of the shafts for delivery to the preparation plant. If the plant is out of commission, raw coal or refuse may be loaded into railroad cars and, thereafter, reintroduced into the preparation plant by means of an F. & C. Marshall type car dumper and conveyors AD and AE.

## Electrical Equipment

All the driving motors, which operate on a 500/550 v supply, are of the totally enclosed, fan cooled, dust and weatherproof type, and both slip ring and squirrel cage machines are installed. The whole of the contractor starting equipment is installed in a central switchroom for convenience in maintenance while the various push-buttons for controlling the equipment are grouped about the plant on desks and wall mounting panels. Suitable lights are fitted on both the desks and panels to indicate whether or not a particular unit is running, and in certain instances ammeters, temperature recorders and other instruments are also provided.

The majority of the plant is electrically interlocked in order to ensure that it is started up in the correct sequence and to avoid equipment becoming buried with material in an emergency. Interlocking has been arranged, however, so that a minimum of equipment is tripped out by means of the sequence arrangements.



No. 1 Chance cone showing the middlings extraction column



# Wheels of GOVERNMENT



As Viewed by **HARRY L. MOFFETT** of the American Mining Congress

FEW actions of importance to the mineral industries have been taken by the Government Departments and agencies since Congress returned home. The Nation's Capital is primarily a beehive of political activity, with both parties stepping up their campaign activities from this vantage point. Not until the people decide the make-up of the new Congress and who will occupy the White House next January, will there be much of a flurry on the administrative front.

Administration officials, when not in the hustings, are giving serious attention to two major activities—preparation of the budget for the next fiscal year, and the Suez situation.

Mineralwise, Secretary of Interior Fred A. Seaton has reiterated his promise that his Department will submit recommendations for a national minerals policy to the next session of Congress early in January. No hint has yet been given as to what form such policy recommendations will take.

## Tariff Study Begins

A House Ways and Means Subcommittee, headed by Rep. Hale Boggs (Dem., La.) has opened hearings on the relation of United States customs and tariff laws and the trade agreements program to our foreign economic policy, and their effect upon domestic industry and agriculture. Following the hearings members of the subcommittee will go abroad to complete their study of trade problems.

Out of the hearings and the foreign visits are expected to come recommendations for revamping both the customs laws and trade agreements program. Many members of the committee are sympathetic to the placing of some restrictions upon imports of specific commodities, such as residual oil and textiles, which are coming into the United States in such volume as to seriously affect domestic producers. A clearer picture of what the Committee will develop in the way of suggested legislation may be possible early in November.

## Higher Freight Rates Sought

Officials of eastern railroads are urging western roads to join with them in a petition to the Interstate Commerce Commission for an increase of 15 percent in freight rates. Following a meeting of eastern rail executives, it was predicted that the roads would seek this increase within a month or two. Some southern railroads have expressed reluctance to asking for rate hikes.

Rail officials say that higher rates are necessary to offset expected wage boosts.

Meanwhile the Interstate Commerce Commission has temporarily denied the railroads any increases in demurrage charges. The ICC ordered the carriers to maintain present demurrage rates until March 31, 1957, while it makes a thorough study of the reasonableness of their request that charges be increased to \$4 for each of the two days following expiration of the traditional free time, to \$7 for each of the next two days, and to \$10 per day thereafter including Saturdays, Sundays and holidays. Present rates call for a charge of \$3 per car for each of the four days following expiration of the free time and \$6 per day thereafter, excluding Saturdays, Sundays and holidays.

## Oil Imports to Be Cut?

ODM Director Arthur Flemming has issued a sharp warning to oil importers that the Government has lost its patience with them for failing to reduce imports of crude oil in accordance with his previous request.

Flemming has pointed out to the importers that on three occasions he has called for adjustments of oil imports to the same level as the ratio of imports to production in 1954. He expressed disappointment at their failure to heed these requests voluntarily, and pointed out that a formal petition is before ODM requesting him to make a recommendation to the President for oil import restrictions, under terms of the Trade Agreements

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## Washington Highlights

**TARIFF STUDY:** Opened by House Committee

**FREIGHT RATES:** Increase being sought

**OIL IMPORTS:** ODM demands cuts

**SEC REGULATION "A":** Amendments proposed

**COAL RESEARCH:** Hearings postponed

**ANTHRACITE DRAINAGE:** Program begins

**URANIUM:** AEC promises foreign aid

**COAL EXPORTS:** Company seeking 80 ships

★ ★ ★ ★ ★ ★ ★ ★

Act, should he find that the current flow of imports is threatening to impair the national security. Hearings are being held on the petition this month.

Meanwhile, public hearings on the request of the domestic fluorspar industry for mandatory restrictions on imports of fluorspar under the same provision of the Trade Agreements Act have been postponed until November 12.

## New SEC Regulations Proposed

The Securities and Exchange Commission has proposed that its Regulation "A," which controls stock issues of \$300,000 or less, be amended to make the general exemption from registration available only to issuers and offerings meeting specified standards, based either upon the existence of a record of net earnings or upon a limitation of the number of securities to be issued.

The Commission also has under consideration a proposed amendment to Regulation "A" which would provide that the financial statements required to be contained in offering circulars

be certified by independent public or certified public accountants, and would require that the certifying accountant consent to the use of his name on the certificate.

Views and comments on the proposed amendments may be submitted in writing to the Securities and Exchange Commission, Washington 25, D. C. on or before October 15.

### Coal Hearings Postponed

Hearings by a House Interior Special Subcommittee into coal research problems, which may result in the introduction of legislation at the next session of Congress, have been postponed until mid-November. Chairman Edmondson (Dem., Okla.) said that the postponement was decided upon because the hearings could be more effectively conducted after the November elections.

Present plans call for the subcommittee to visit several coal areas. One of the field hearings will be held in Pittsburgh, Pa., at which J. D. A. Morrow, chairman of the board of the Joy Manufacturing Co., will testify on behalf of the Manufacturers Division of the American Mining Congress. Dr. W. C. Schroeder has already testified for the Coal Division of the American Mining Congress, and has recommended that coal research be pressed through cooperative Government-industry channels and through Government contracts with private research organizations, under a program similar to that now being used by the Atomic Energy Commission.

### Tungsten Regulation Issued

The General Services Administration has issued its regulations governing purchase of tungsten under the recently enacted law which provides for continued buying of domestic tungsten at \$55 per unit.

Under the new regulation, domestic tungsten producers must apply to GSA for a certificate of participation, application for which must contain data concerning the nature and extent of the applicant's interest in or control over any tungsten mining properties. When issued a certificate, the applicant will be able to deliver tungsten f. o. b. carrier's conveyance, milling point. The Government will not accept offers for delivery in any calendar month from any producer of ores in excess of 5000 short-ton units originating in any one mining district from properties controlled by the producer. Tungsten concentrates already actually produced which were ready for delivery and offered in July, will be accepted and applied against the July quotas of the producers of ores used in making tungsten concentrates. Similarly, tungsten concentrates produced and ready for delivery in August will be accepted and applied against August quotas of producers.

The purchase program is limited to

1,250,000 units of tungsten trioxide and will expire not later than December 31, 1958. Funds are currently available for purchase of 285,000 units; Congress is expected to make further funds available early next year.

### Anthracite Projects Approved

Two projects under the \$17 million Federal Government-Pennsylvania State program for anthracite mine drainage have been approved by Interior Secretary Seaton.

Under the projects, additional pumping equipment will be provided at the Delaware-Pine Ridge mine near Wilkes-Barre of the Hudson Coal Co. and at the Glendower mine in the southern anthracite field. Cost of the projects is expected to approximate \$500,000, which will be shared equally by the Federal Government and the State of Pennsylvania. The two projects are expected to save millions of tons of anthracite from inundation by mine water.

### AEC Foreign Uranium Aid

The U. S. Atomic Energy Commission has approved a program for aiding friendly foreign nations in uranium exploration.

Under the program the United States will offer assistance as follows: (1) access to information on uranium geology and exploration techniques; (2) encouragement of geologists and technicians in interested countries to visit the United States and study uranium deposits and Commission explora-

tion and laboratory projects; and (3) AEC geologists will visit other nations to discuss uranium geology and exploration techniques and make brief investigations of known uranium occurrences and favorable areas.

AEC said it felt the rapid increase in the scope of atomic progress, especially the development of nuclear power, will stimulate the development of uranium resources in many countries to meet their own future requirements for civilian uses of nuclear energy.

### Coal Group Seek More Ships

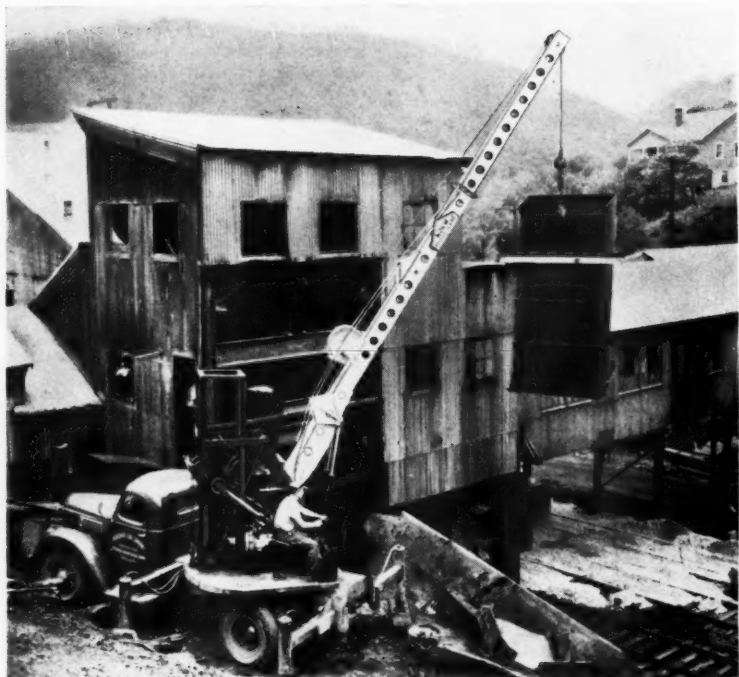
American Coal Shipping, Inc., the newly-formed organization of coal companies, coal-carrying railroads, and the UMW, has told the Federal Maritime Board that it will need a total of 80 ships to move U. S. coal to Europe. In its original request for a charter, the company had sought a total of 30 ships but this has since been amended. The additional 50 vessels would be used on a general agency basis instead of a charter basis. This means they could be operated for Government account with the company acting as agent and assuming no risks. The company said the added ships would be needed because of the Suez crisis, recent disasters in Belgian mines, and the withholding of Polish coal from the export market.

The Board is continuing its hearings on the company's application for the original 30 ships, and shipping interests are still opposing the entry of the new firm into the coal export field.

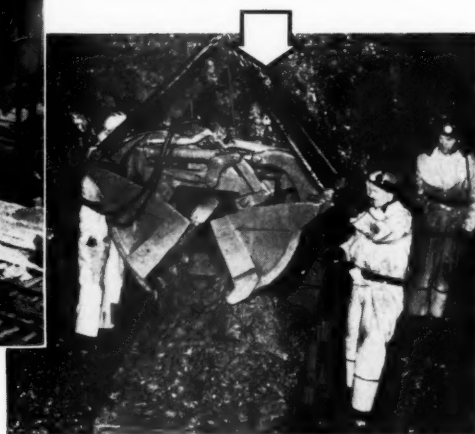


# Extra Reach with Precision Touch

## NEW ½-Yd., 9-Ton H-5 HYDROCRANE



Muck comes up, shaft goes down — fast with a Hydromucker. Eliminate tough, expensive hand-mucking with this hydraulic bucket. Controlled from upper shaft, it loads blasted rubble from the shaft floor to skip or other conveyor for removal to the surface. Owners report up to 35 per cent faster mucking, 30 per cent less man power by using the new Hydromucker.



The Bucyrus-Erie H-5 Hydrocrane combines 50 feet of maximum boom reach, plus a 20-ft. jib extension, with all the work advantages of smooth, precise hydraulic power and control, all the travel advantages of a conventional motor truck. In addition, the boom extends and retracts hydraulically within a 12-ft. range—while the crane-excavator is working. With this machine you can handle mine timbers, erect and dismantle conveyor machinery, clean up ore spillage, dig trenches, clean out drainage ditches—maneuver in close quarters with a smoothness and safety never before possible with a crane-excavator in the 50-ft. boom range.

### New Flexibility, New Roadability

Patented outriggers permit you to mount the crane on a new or used commercial truck

of your choice. You can select a heavy tandem truck for heavy-duty work or a lighter truck for fast between-mine travel, and still meet highway laws for over-all length and axle loads. Both the high-lift 50-ft. boom and the standard 36-ft. boom retract to 25 feet for travel. Maximum over-all length, depending on truck, is under 35 feet.

Get all the facts now on the new H-5 and the improved ¾-yd. H-3 Hydrocrane from your Bucyrus-Erie distributor.

136H56



South Milwaukee, Wis.



# Personals

Ross D. Leisk has announced his resignation as vice-president of Sunshine Mining Co. to give more time to personal business.

Leisk said he would continue active in mining matters and would do a limited amount of consulting work, including some for Sunshine.

A recognized authority on silver, he was made general manager of Sunshine in 1936 and vice-president and general manager in 1954.

One of his outstanding accomplishments with the firm was the working out of complicated apex and extralateral rights problems which avoided costly litigation and resulted in the discovery and mining of deep ore bodies in adjoining properties under profit-sharing agreements.

Prior to coming to the Sunshine Mining Co. in 1936, he was engaged in copper mining in Arizona and in engineering and mine examination work in Africa and South America.

Active in mining organizations, he served as program chairman of the 1951 AMC Metal and Industrial Minerals Convention in Los Angeles.

Charles B. Lakin has been elected vice-president, operations, of the Berwind-White Coal Mining Co. Lakin continues his headquarters at Philadelphia where he has been associated with the company for some time in operations and other departments.

Stephen W. Ward has been appointed superintendent of maintenance and construction for American Smelting & Refining Company's northwest mining department, according to J. C. Kieffer, department general manager. Ward joined Asarco on July 16 as a replacement for Art Boyer who went to the Bunker Hill Co. several months ago.

Ward came to Asarco from Cia Minera de Penoles, Zacatecas, Mexico, where he had been electrical and mechanical superintendent since 1952.



Ross D. Leisk

Previously he had held similar positions with Aluminum Company of America at Port Lavaca, Tex., and with the Tsumeb Corp. at Tsumeb, South West Africa.

Ewalt Herzog of Pleasant Grove, Ohio, has been promoted to the position of safety director of Hanna Coal Co.

He succeeds William J. Schuster of St. Clairsville who retired after a long career in the safety movement during which he was head of the coal mining section of the National Safety Council.

The new director has been safety director of both Dungen and Glen Castle mines.

The appointment of Lloyd L. Fusby as western manager and Roger W. Hinchman as general sales manager has been announced by the Pacific Coast Borax Company Division of United States Borax & Chemical Corp. In making these two appointments J. F. Corkill, vice-president and general manager, announced Fusby will continue to make his headquarters in Los Angeles and Hinchman will remain in the New York headquarters.

Fusby, a chemical engineer, has progressively been superintendent of the Boron Plant, production manager, and will now have over-all responsibility for production at both Wilmington and Boron.

Hinchman has been with the company since 1941. Until his present appointment he has been in various sales positions, including Eastern industrial sales manager.

Glen E. Kitchen, formerly assistant general superintendent of Carbon Fuel Co., has resigned that position to accept the post of general manager of Ohio operations of Simpson Creek Colliery Co.

Kitchen, who will maintain his headquarters in Zanesville, Ohio, has spent five years in the employ of Carbon Fuel.

## 1957 Coal Show

PLANS are rolling for the 1957 American Mining Congress Coal Convention and Exposition scheduled for Cleveland, Ohio, next May 13-16. With the appointment of A. R. Matthews, president, Pocahontas Fuel Co., Inc., as chairman of the Program Committee for this great industry meeting, the development of another outstanding convention program is under way. Matthews and a nation-wide committee of coal mine operators and equipment manufacturers will handle the highly important job of selecting topics and speakers, and organizing convention sessions to bring the industry up to date on the latest technological advances in all phases of coal mining and coal preparation.

Suggestions as to subjects and speakers should be sent to the American Mining Congress, Ring Building, Washington 6, D. C. In mid-November the Program Committee will meet to consider all the suggestions that have been submitted and to draw up a comprehensive, well-rounded program.

Equipment manufacturers have already been making plans for next year's Coal Show and many are preparing to introduce new products at that time. All types of equipment, including machinery and supplies designed for use in the many phases of underground and strip mining as well as in preparation plants, maintenance shops and power systems, will be exhibited in what promises to be the greatest Coal Show ever.



C. E. Hill has been appointed manager of the American Vermiculite Company's Enoree River plant, Cross Anchor, S. C. Hill, who has been employed by the company for the past 2½ years, replaces J. B. Stribling, retired. Previous to his connection with the company plant, Hill was an electrician in Columbia.

The plant was built under the supervision of Stribling and has been in operation for 2½ years.

Guy Browning has been appointed general superintendent of the Lorado Coal Mining Co. operations at Lorado, W. Va., according to Stanley B. Johnson, Jr., president.



Guy Browning

A native of Gilbert, W. Va., Browning's 20 years coal mining experience includes positions of section foreman, industrial engineer, mine superintendent and underground superintendent with the United States Steel Corp., Gary, W. Va., Island Creek Coal Co., Holden W. Va., Central Coal Co., subsidiary of American Gas and Electric, New Haven, W. Va.; and Kentland-Elkhorn Coal Co., Dunlap, Ky. Prior to joining the Lorado organization, he was associated with Robinson and Robinson, Mining Engineers, Charleston, W. Va.

J. W. Foust, who has been assistant manager of Peru Mining Co., succeeded Joseph H. Taylor as manager of operations for the company and its several subsidiaries. Although Taylor has retired from active participation in the company's management, he will continue as vice-president and serve in an advisory capacity.

John F. Varela, certified public accountant of Los Angeles, has been elected secretary-treasurer of Gold Metals Consolidated Mining Co., according to Gordon Neaves, president. Varela was formerly connected with Farmers Merchants National Bank for 18 years.

Michael J. Messel has been appointed general manager of Lake Asbestos of Quebec, Ltd., a wholly-owned subsidiary of American Smelting and Refining Co. Messel has been closely associated with asbestos property evaluation, and asbestos mining and milling for the last 18 years.

Leslie V. Whiton has announced the opening of an office at White Plains, N. Y., for consultation on matters pertaining to the production and marketing of non-ferrous metals.

R. D. Perry has been appointed vice-president and general manager of Consolidated Mining and Smelting Co. of Canada, Ltd. He replaces R. W. Diamond, retired, as the firm's senior officer in Western Canada. Perry started his career with Cominco as an assayer in 1928.

John M. West, former assistant general superintendent of Manganese, Inc., has been transferred by the parent company, Haile Mines of New York, to Miami, Fla., where he will have charge of a gravel dredging operation recently acquired by the company.

Royce A. Hardy, general manager of Manganese, Inc., announced that William L. Kendrick, mill superintendent, will assume West's duties as assistant to general superintendent John Anderson. All are residents of Boulder City, Nev.

West, a son of the late president of Haile Mines, H. S. West, of New York, came to the Manganese, Inc., property five years ago, shortly after it was taken over by Haile Mines, and played a prominent part in development of the mine and building of the 1200-ton mill.

W. O. Sydnor retired September 1 after a 44-year career with the Chesapeake and Ohio Railway. For the past nine years he has held the post of coal traffic agent in Beckley, W. Va. High officials of coal companies and the C & O assembled at a luncheon last August to honor Sydnor on his retirement. On September 1 he began a new job, managing director of the Beckley Chamber of Commerce.

V. D. Perry, chief geologist for Anaconda Co., is moving his headquarters from Salt Lake to New York.

Ronald B. Mulchay, Tucson, Ariz., has been named assistant chief geologist for Anaconda at Salt Lake City, according to Perry. Mulchay will be in charge of Anaconda exploration activities in western United States and Mexico. He will also have supervision of geological work at Anaconda Company's operations in Mexico and in all western states outside of Montana.

James L. Kelly, a former resident of Salt Lake City and presently chief geologist at Anaconda uranium operations, Grants, N. Mex., has been named division geologist at Tucson, succeeding Mulchay.

John Frassinelli has resigned as senior industrial engineer of the United States Steel Corp. coal mines at Gary, W. Va., to join the consulting engineering firm of Robinson and Robinson, Charleston, W. Va. He has worked for Pennsylvania Coal & Coke Corp. and Lehigh Coal & Navigation Co. and is a graduate of Pennsylvania State University with a degree in Mining Engineering.

## — Obituaries —

Ewart Strawbridge, 58, secretary and assistant treasurer, Goodman Manufacturing Co., Chicago, died September 3.

Mr. Strawbridge had been associated with the company 35 years, starting as a trainee in 1921 following graduation from the University of Illinois. He was instrumental in organizing several Goodman branch offices in mining areas and responsible for a flow of stock to these offices.



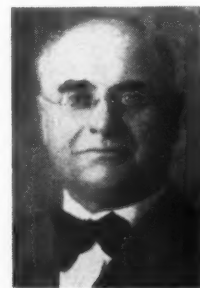
Ewart Strawbridge

Since 1930 when he was appointed assistant treasurer his duties kept him at the main plant where his responsibilities mounted with appointment as assistant secretary and later as secretary.

Thomas L. Doorley, 79, one of the best known coal men in Southwestern Pennsylvania, died recently. After serving as superintendent of numerous mines of the H. C. Frick Coke Co., he retired to operate his own mines.

George W. Lascher, 47, Pittsburgh district sales manager for Mine Safety Appliances Co., Pittsburgh, died August 1 at Somers Point, N. J. Mr. Lascher, a native of Pittsburgh, had been with MSA since 1942.

George B. Pryde, retired, died August 21. He came to this country in 1893 from Scotland. After working briefly in Colorado, he went to Rock Springs and



Geo. B. Pryde

employed as a miner by The Union Pacific Coal Co. in December 1893. He rose rapidly within the company, being appointed mine foreman in 1904, mine superintendent in 1911, and assistant general superintendent at Cheyenne in 1912. He became general superintendent in 1913, and was advanced to vice-president and general manager in 1924. On January 1, 1938, he was made vice-president of operations—the position he held at his retirement in 1944 after a half century as an outstanding leader in the mining field and in the community of Rock Springs, Wyoming.



W. F. MUNFORD

Portrait by Fabian Bachrach

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# MINING CONGRESS JOURNAL



# NEWS

## and VIEWS



### Eastern and Central States



#### Earn National Recognition

Individual and mine safety records at Montcoal No. 1 mine of Armco Steel Corp., Montcoal, W. Va., have been given national recognition by the Joseph A. Holmes Safety Association.

A Holmes certificate of honor was presented to Arnold Bailey, timberman and trackman at Montcoal, for working 43 years in the mines without a disabling injury. Another Holmes certificate of honor went to A. E. Oakley, mine superintendent, for that operation having worked 2,846,048 man-hours and having produced 3,199,530 tons of coal without a fatality.

#### Foote Plans Expansion

Foote Mineral Co., Philadelphia, will spend more than \$500,000 for improvements and additions to its Kings Mountain, N. C., plant during the remainder of this year and 1957. Planned improvements include an estimated \$142,000 for the maintenance shop, \$110,000 for office and

laboratory expansion, and \$350,000 for additional service buildings and new processing equipment. Most of the projects will be initiated this year and completed by the end of next year.

Spodumene is mined and milled at this operation, which employs 230 people.

#### Maine Surveys Minerals

The State of Maine's new Department of Industry and Commerce has employed a full-time geologist, John Rand, and is undertaking a study of the State's mineral resources. Rand is gathering data on Maine's flourishing 19th century granite industry, as well as on feldspar, mica and other Maine minerals.

Department figures show that only 2.5 percent of Maine is covered by detailed geological maps which meet modern standards, although neighboring New Hampshire is 53 percent covered.

#### Mine Blast Fatal to Two

Two members of a five-man crew were killed late in August in a copper mine explosion three miles south of Mass, Mich. A third man suffered first, second, and third-degree burns; another was gassed, and the fifth was treated and released.

The men were checking old workings in the Caledonia mine of Calumet & Hecla, Inc., for possible reworking. The explosion was believed

to be caused by an accumulation of marsh gas (methane) in the mine, but there were no immediate reports as to what ignited it. The men were killed by concussion; there was no fire or falling rock.

#### Coal-Electric Plant Planned

American Gas & Electric Co. has announced plans for building a \$58,000,000 electric power plant on the Wabash River south of Terre Haute, Ind. The new plant will house a 450,000-kw generating unit, with design provisions for eventual expansion to 900,000 kws.

Ayrshire Collieries Corp., Indianapolis, will supply full fuel requirements of 1,300,000 tons of coal a year under terms of a 15-yr contract. Construction of the mine and a private six-mile railroad will involve an expenditure by Ayrshire Collieries of more than \$4,000,000.

Indiana and Michigan Electric Co., a subsidiary of American Gas & Electric, will build the new power station, with completion scheduled for late in 1958.

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## Annual Coal Division Conference

William Penn Hotel, Pittsburgh, Pa., Friday, November 16, 1956

THE 1956 Annual Conference of the American Mining Congress Coal Division will be held at the William Penn Hotel in Pittsburgh, Pa., on Friday, November 16, 1956. The one-day meeting will convene at 9:30 A.M. and adjourn about 4:30 P.M. One of the day's attractions will be a business luncheon with an address by an industry leader.

A cordial invitation is extended to coal operators and equipment manufacturers to attend the Conference, hear the subcommittee presentations, and take part in the open floor discussions. Reports to be presented by the various committees, giving the results of investigations carried on during the past year, are listed below.

These reports are based on field experience and will be presented by men widely acquainted in their particular fields. Copies of each report will be distributed to the audience so that all may have an opportunity to offer comments or suggestions—which will be carefully reviewed by each subcommittee concerned in preparing its final report.

**Committee on Coal Preparation**—R. L. Llewellyn, Eastern Gas & Fuel Associates, chairman—Operation and Maintenance of Mechanical Drying

Equipment—Operation and Maintenance of Thermal Drying Equipment—Washery Water Clarification.

**Committee on Conveyor Haulage**—H. A. Jones, Carbon Fuel Corp., chairman—Conveyor Installation—Conveyor Operation and Maintenance—Safety Controls for Underground Belts.

**Committee on Mechanical Mining**—Wm. E. Hess, J. & L. Steel Corp., chairman—Dust Prevention with Water Sprays at the Face—Industrial Engineering—Continuous Mining Systems.

**Committee on Rail Haulage**—J. D. Reilly, Hanna Coal Co., chairman—Track Installation—Track Haulage Operation—Haulage Road Maintenance—Revision of Haulage Roads Booklet.

**Committee on Roof Action**—J. Allan Brookes, Mather Collieries, chairman—Specifications for Mine Roof Bolting Materials—Design of Mine Roof Bolting Patterns—New Types of Bolting Equipment—Geological Studies on Mine Roof.

**Committee on Underground Power**—J. A. Dunn, Island Creek Coal Co., chairman—Temporary Cable Splices—Permissibility Problems—Mine Lighting—Flood Protection for Underground Substations—Voltage Drop in Trailing Cables.

### Coal Pipeline Completed

Pittsburgh Consolidation Coal Co. announced September 12 the completion of the laying of pipe for the 110-mile coal pipeline between Cadiz, Ohio, and Eastlake, Ohio. A contract between Cleveland Electric Illuminating Co., and Pitt-Consol calls for the delivery of 18,000,000 tons of pipeline coal over the next 15 years.

The line lies four ft below the sur-

face over the total distance between Pitt-Consol's Georgetown, Ohio, operation and CEI's Eastlake Power Station. Under construction now are the three pumping stations which will be located approximately 35 miles apart.

Fine coal mixed with water to form a slurry will be pumped into the line at the Georgetown Preparation Plant. At the Lake Erie end, the coal moving

at the rate of 150 tons per hour will be dried and sent directly into boilers to be transformed into steam for making electric power.

First tests are expected to be made on the line late this year. The schedule calls for coal delivery to begin early in 1957.

The ten-in. (inside diameter) pipeline will use 36,000 gal of water per hour to deliver the 150 tons per hour of coal initially called for. Slurry will travel at a rate of  $3\frac{1}{2}$  miles per hour and will use approximately 30 hours to traverse the 110 miles from the coal preparation plant at Cadiz to the power station at Eastlake. Cost of the pipeline was in excess of \$10,000,000.

### Coal Car Information

The Chesapeake and Ohio Railway will establish a freight car movement information center, first ever operated by the railroad, at Huntington, W. Va.

After the center is established, it will be possible for a shipper to learn, by calling the center, exactly where his car of freight is in transit, either on C&O or off-line. The information compiled in Huntington will be transmitted directly to C&O's Univac computing center in Cleveland, so that statistics as to freight movements can be available within minutes.



A section of the now completed 110-mile coal pipeline from Cadiz, Ohio, to Eastlake, Ohio, is treated with coal tar enamel heated to 350° F. The pipeline is then wrapped with glass cloth, forming a protective shield against air and moisture

## Safety Day Awards

Armco Steel Corp. coal mines staged their 26th Annual Safety Day recently at Montcoal, W. Va., with a six-man first-aid team from the Robin Hood mine emerging victorious in the yearly contest.

The winning team, led by E. W. Schultz, captain, dropped only 13 discounts on three simulated problems in first aid to score 1487 out of a possible 1500 points and easily outdistanced the four other men's safety teams.

Two girls' teams also competed in the contest, with the Stickney team, captained by Irene Charles, winning with 1452 points of a possible 1500.

## North Carolina Copper

A Toronto, Canada, company, Apalachian Sulphides, expects to begin production of copper for concentrates near North Wilkesboro, Ashe County, N. C., early in 1957. The company is spending approximately \$2,000,000 for development work at the Ore Knob Mine, where the first mining was done in 1856.

The company has sunk a shaft to a depth of 1037 ft, and has erected a number of buildings, including an assay building, warehouse, machine shop, hoist and compression shop.

Anticipated annual payroll of the mine is \$400,000. Survey work has indicated that the underground ore deposit is of sufficient size for several years of operation.

## Alumni Fund Gift

The Dayton Alma Coal Corp., Williamson, W. Va., has contributed \$500 to the principal of the West Virginia University Alumni Fund, raising the fund to \$65,870.

## Buys Limestone Deposit

Medusa Portland Cement Co., Wampum, Pa., has purchased a limestone deposit for \$200,000 from the Carbon Limestone Co.

The deposit will supply Medusa's new \$12,000,000 cement plant, giving it a 30-year reserve of stone.

## Fly Ash in Cement

Allis-Chalmers, a major mining machinery manufacturer, has announced that pilot-scale tests at the company's newest development laboratory have shown that fly ash can be substituted for shale or clay in making portland cement.

Utilization of fly ash in cement production, according to Allis-Chalmers, promises an important new outlet for large tonnages of the material and offers several important advantages to both utilities and cement producers. The company added that carbon re-

moval from fly ash can be accomplished with commercially available gyratory screens.

Meanwhile, the Wisconsin Electric Power Co. announced that it plans to supply approximately 50,000 tons per year of fly ash to the first unit of Marquette Cement Co.'s new Milwaukee plant. About 15 to 16 percent of Marquette's raw material feed will be made of fly ash used as a substitute for shale.

## Brazil Zinc Discovery

A recently discovered zinc ore body in Brazil may be one of the world's major deposits, a U. S. Geological Survey study has disclosed.

The deposit, which also contains copper, is located near the village of Vazante, in northwest Minas Gerais.

The USGS report said samples from the area average 35 percent zinc and that the faults in which mineralization occurs extend over an area of approximately five miles. The fault zones range from a few yards to more than 65 yards in width.

The USGS estimated that a flotation plant will require an initial investment of \$10,000,000, once the mine itself is in operation. Vazante is near a railway.

Study of the area by the USGS was undertaken in collaboration with the

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International Cooperation Administration and the Brazilian government.

The discovery is particularly important for Brazil because at present that country must import practically all of its zinc and copper. So large a deposit could permit exports, officials indicated.

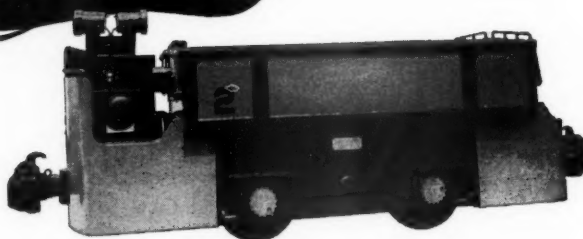
## Old Mine Reopens

Norfolk & Chesapeake Coal Company's modernized Wilson mine, one of the oldest continuously operating mines in West Virginia until its closure in 1954, has been reopened. The mine has a new tippie and coal preparation plant and has been completely mechanized to produce about 700 tpd.

## GREENSBURG EIGHT TON MONITOR

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...for top performance  
"Double Equalizers"  
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The Greensburg 8 ton Monitor is equipped with two glass insulated motors, contactor type controller and double equalizers. These double equalizers make the difference in performance . . . more tractive effort, better brakes, better riding qualities and longer battery life than any other storage battery locomotive of equal weight and battery capacity!

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## Mine Production Begun

Christopher Coal Co.'s newest mine, the Humphrey Mine, north of Morgantown, W. Va., has started producing coal for the Pittsburgh area steel mills. Production is expected to reach 6000 tpd by the end of the year.

When the mine reaches maximum production, according to company President Charles R. Nailler, it will employ 400 men and turn out 20,000 tpd. The mine is expected to have a life of 30 years.

## Manganese Plant Expansion

A \$2,000,000 expansion of Foote Mineral Company's Electro-manganese Division facilities at Knoxville, Tenn., is now under way. When the expansion is completed, the plant will be able to add 7,000,000 lb annually to its production of electrolytic manganese. The company will then have a total annual capacity of about 22,000,000 lb of manganese.

## Mine Wastes Studied

North American Coal Corp., whose principal mining operations are in Belmont County, Ohio, has undertaken a project to refine mine wastes for commercial use.

A Cleveland scientist has been employed to supervise the company's research which has to do with separating iron oxide and alumina from the piles of mine waste.

## Powder Blasting

(Continued from page 48)

doze chambers where two men were employed in each chamber. There was also a saving in development. The scraper drift sill was secure as the possibility of the sill being undermined by caving into the transfer raise had been eliminated. Under the old system the ground between the wing raise and the main transfer raise would sometimes cave out and eventually endanger the bulldoze chamber. Draw holes were established on both sides of the scraper drifts. Wing raises out of the scraper draw holes were run out to the limits of the block. Knuckle back raises off the wing raises connected with the mining sublevel which in turn connected all the wing raises. The ground over the wing raises was taken out by shrinkage mining. The pillars between the wing raises were broken out by percussion drill blast holes off the mining sublevel and engineered so that a cone was formed over each scraper draw hole. The two raises to the level above had been laid out for blast hole mining but fitted into the planning for powder blast mining as shown in Figure 7.

Figure 7 shows a plan of the No. 1 powder blast. Mining was done at

the same elevation in two separate operations off the 28 raise and the 32 raise. The drifts and crosscuts were 4 by 6½ ft. The ends of the powder pockets had the last 8 ft mined at 2½ by 2½ ft in section. The equipment used in mining the powder blast workings were jackleg drills and 5 hp slushers. Sufficient development muck was left in the workings to backfill the powder pockets following loading.

The crosshatch section on Figure 6 indicates the break following the detonation of the No. 1 powder blast.

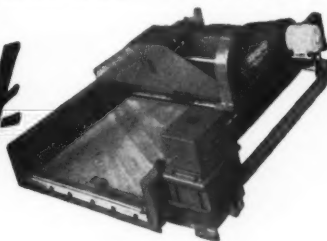
The dashed lines above the succeeding powder blasts indicate the extent of overbreak and caving.

Powder blasting at the Britannia Mine has been developed and used successfully for primary breaking in large low grade orebodies where low production costs are important.

The writer wishes to thank the Britannia Mining and Smelting Co., Ltd., for the opportunity of presenting this paper and to acknowledge with thanks the assistance received from the mine engineering staff in its preparation.

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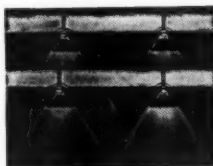
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INTEGRATED HEAT SCREENING**

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## To Set Up Aluminum Firm

Revere Copper & Brass Co., Inc., and Olin Mathieson Chemical Corp. have been conferring on the possible joint formation of a company to produce aluminum pig and ingot. Tentative planning calls for 180,000 tons of aluminum to be produced by the new company. Of this total, two-thirds would go to Olin and the remainder to Revere for fabrication.

Earlier this year Olin announced plans to build two plants in the Ohio River valley which would have initial yearly output of 60,000 tons of aluminum and 230,000 tons of alumina.

## Benefits Total \$124,000,000

The United Mine Workers' Welfare and Retirement Fund paid out \$123,913,788 in benefits to 206,919 coal miners and members of their families in the fiscal year ended last June 30.

The Fund, which is the largest private organization of its kind in the world, had total expenditures of \$127,662,175 and revenues of \$154,227,174. Thus its unexpended balance increased from \$103,607,911 at the beginning of the year to \$130,172,370 at the close.

Administrative expenses were 2.9 percent of total outlays, reported to be the lowest figure ever achieved by a welfare fund.

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## Coal Electric Use Rises

Consumption of coal for fuel in the production of electric power in 1955 rose nearly 20 percent, while the cost to the consumer declined almost four percent, a National Coal Association study reveals.

NCA reported that expanding demand of electricity raised coal consumption to 136,600,000 tons in 1955, from 113,900,000 tons in 1954. NCA's figures were based upon reports from 761 steam-electric plants in 46 states

and the District of Columbia, which were filed with the Federal Power Commission. NCA said the report accounted for 95 percent of the total domestic steam-electric plant coal consumption.

The NCA study found that in coal-competitive areas, such as New England, the North Central States, and Middle Atlantic region, coal in 1955 held 85 percent of the total steam-electric utility fuel market, a rise of almost five percent from the 1954 level.

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Most widely used communication for underground haulage.

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Finest communication between control points in cleaning plants.

### CONTROLS

Save time and money by remote control of pumps, fans, sub-stations, etc.



## To Build \$6,000,000 Plant

Fansteel Metallurgical Corp., North Chicago, Ill., will build a \$6,000,000 plant designed to increase present production of tantalum by 50 percent and columbium by 150 percent.

The present North Chicago plant, including a \$1,000,000 expansion now being completed, is unable to meet rapidly growing demand for these metals used in nuclear reactors.

## Ohio Coal Property Sold

Muskingum Coal Co., Zanesville, Ohio, has sold its holdings and properties to Simpson Coal & Chemical Co., New York City, for more than \$1,000,000. Muskingum holdings include 13,000 acres of coal land in Muskingum, Perry and Morgan Counties. The principal mine, the Misco, near Crooksville, produces more than 1,000,000 tons of coal a year. The mines employ more than 400 workers.

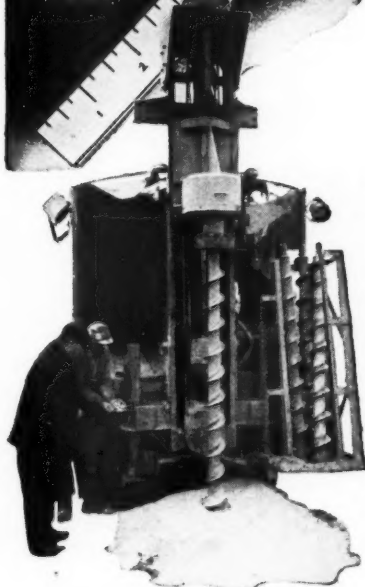
## New Mines Bureau Building

Mount Hope, W. Va., will be the site of a new \$700,000 building for the U. S. Bureau of Mines, which will house equipment and personnel who supervise and inspect the coal mines in the district of southern West Virginia, eastern Kentucky and southwest Virginia.

The brick and concrete building, to be air-conditioned, will include both office and laboratory space.

## MEASURE DRILLING SAVINGS

by  
the  
foot\*



### McCARTHY NEW HEAVY-DUTY VERTICAL AUGER DRILL

\*Strip Miner Drills 8-1/2" Blast Holes 60 Ft.  
Deep in 1 Hour, Including Moving Time.

Savings, like costs, are measured by the foot, especially in tough earth and rock formations. Using the new McCarthy 106-24 Vertical Drill, this Pennsylvania strip miner cut drilling time to 1 hr. per hole (including moving time) on 60-ft. blast holes 8 1/2" in diameter. Formation was 20 ft. of soft top strata, 35 ft. sandstone and 5 ft. of hard sandstone and bastard limestone.

A new speed reducer on Model 106-24 slows auger rotation for drilling harder rock formations. The result is more torque, or "biting power." You have fewer bit failures, cutting over-all drilling time. Driller above used tungsten carbide bits.

The McCarthy Model 106-24—"World's Fastest Heavy-Duty Vertical Auger Drill"—handles augers from 3" to 24" in diameter.

Write for Bulletin M-100



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## Preventive Maintenance

(Continued from page 59)

shift, truck number, operator's number, pit supervision, repair shop supervision, mechanics on each repair and the repair itself. In all cases, code numbers are used.

The I.B.M. system is comparatively simple, putting all mechanics on a time-clock. The card indicates his name, number, date and shift. When allocated work by his foreman, he punches the clock, goes out and does the job. He then fills in the unit number and the code for the work. This is taken from an easily read tabulated list beside the clock. When the job is finished he punches off. His card may indicate ten jobs started and finished, and each one timed off and on. The clerical staff then take this card (used also for the employee's time) and add details such as shift foremen, the operator for the shift, and enter it all on a single sheet ready for I.B.M. punch cards at the office.

Any desired combinations can be obtained from these cards that would show abuses, repetition, duplication, improper work, inferior parts, and so on in endless combination. For example, as soon as we have a transmission failure or axle broken we look up the history of the operator to see if it's getting to be a habit, or if we're had full value from the part, or whether it may have been improperly installed. As one can well imagine, it isn't long before an hour-life value for each part is established.

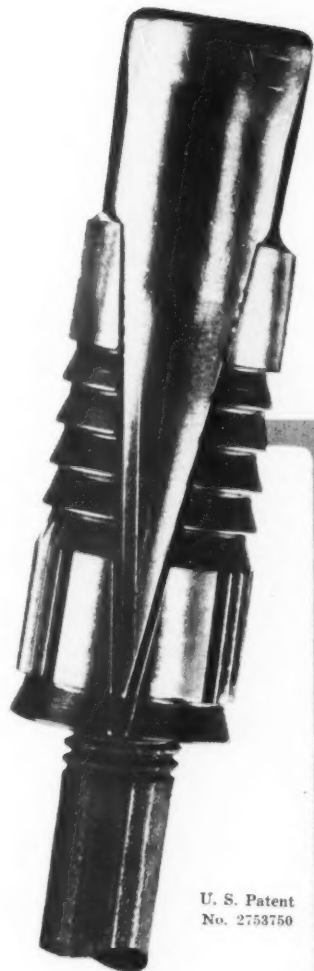
The benefits of a sound preventive maintenance program cannot be denied. It brings law and order into what could be nothing but chaos. Where you have law and order, you have control and safety. Where you have control and safety, you have a shop operating on sound, modern methods.

## Salt Mine Option

Cargill, Inc., a Delaware corporation, has an option to lease Cote Blanche Island, La., for salt mining. Attached to the option is a lease form covering the terms of the mining agreement, to become effective December 31, 1956, if Cargill exercises its option.

Terms of the lease include salt mining with the sinking of shafts or drilling of wells into the salt, as well as the construction of underground and surface facilities related to the mining operations. The area to be mined is restricted to a 125-acre plot.

The lease is to remain in effect as long as salt is mined or the minimum royalty paid, except that the period of royalty payments without actual mining shall not exceed 25 consecutive years.



U. S. Patent  
No. 2753750

Bolting results in less timber maintenance—improved ventilation—reduced waste handling—fewer fire hazards—wider openings—faster haulage and less material handling. Prove the benefits by making your own tests—samples of the PATTIN shells "D-1" (shown above) or the "D-2" will be furnished upon request.

PATTIN expansion shells are available and serviced exclusively through The Colorado Fuel & Iron Corp., Denver, Colorado.

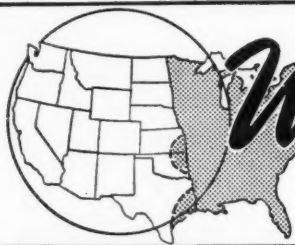
# PATTIN

MFG. COMPANY

Marietta

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Est. 1888



# Western States

## Sees Greater Copper Use

Roy H. Glover, chairman of the board, The Anaconda Co., predicts that adequate world copper supplies "at present prices" will be available during the next five years, but that producers and users thereafter will be faced with the question of "How can production be increased adequately to meet the ever-increasing demand caused by new technologies and applications and ever-increasing populations?"

Glover, in an address before a Montana Press Association meeting recently in Livingston, Mont., correlated the increase in copper demand to output of steel.

By 1960, he said, projections indicate that world steel capacity will be increased by 29 percent—from 297,000,000 tons to 384,200,000 tons.

Consumption of copper is in the ratio of 1.37 lb of copper for each 100 lb of steel, Glover said, adding that "this ratio holds steady, even in spite of substitutions, such as aluminum."

"Projections from known projects disclose that there will be available at present prices, by 1960, 4,242,000 tons of mine and plant capacity which, with return from scrap, should bring the available copper in that year to the required amount," Glover said, "indicating that during this period the projected world steel and copper outputs should have approximately the same balance as in the year 1955."

Anaconda production in the U. S. will be increased from 175,000 tons in 1956 to 253,000 in 1961, a 44.5 percent increase, based on company projections, Glover said.

"Likewise, in Chile we are moving forward in every possible way to meet what we conceive to be the ever-increasing demand," the Anaconda official stated.

In the past 10 years Anaconda has spent over \$350 million, he said, "and for the period of the next five years we anticipate at least equaling this 10-year expenditure."

Noting that "the days of cheaply produced copper are gone," Glover said that productive ability has not kept pace with increasing wages.

Since "technically there is little room for improvement in copper recovery," he declared that the "supply of metal in the future will depend

upon prices that will not only justify but encourage the mining of ores that are now by-passed in the operation, just as ores of less than 5 percent grade were by-passed many years ago."

## Comstock Lode

A decision to resume mining activities on the historic Comstock Lode at Virginia City, Nev., has been announced by Louis H. Seagrave, president of Consolidated Virginia Mining Co.

Con-Virginia will conduct an active program for the development and operations of its holdings on the Comstock Lode, which has been inactive since the Government shut down gold mining operations in 1942. The exploration program will include drill-

ing and open cut operations in virgin areas, and sampling and metallurgical work to confirm previous assays. The program is being undertaken as the result of recent examination of the properties, and research of documented reports, many not previously known to exist. Company studies have indicated that with present equipment and methods, the properties can be made profitable through open-pit operations.

## Eagle-Picher Appreciation Days

The Miami, Okla., Chamber of Commerce sponsored a six-day program in August to recognize publicly the value of the Eagle-Picher Co. to Oklahoma, particularly the part it played in the economic growth of the Miami area.

Designated by civic leaders as "Eagle-Picher Appreciation Days," the period August 15-20 honored the burgeoning industrial firm which started mining operations in the Tri-State district 41 years ago.

With the cooperation of Eagle-Picher, Miami's Mayor arranged for the setting up of several pieces of huge underground machinery from Eagle-Picher mines for display.

Participating in the program were Oklahoma Governor Raymond Gary and T. Spencer Shore, Cincinnati, President of Eagle-Picher.

*The feather-touch with*

# DYNAMITE ACTION!



## MORE EFFECTIVE THAN EVER—MARLA AERO SPRAY PENETRATING OIL GIVES YOU THE ADVANTAGES OF:

### 1. SPRAY

Assures penetration, with pressure, to the most hard to get at objects. Shoots a stream three feet if needed.

### 2. SPEED

Always ready at the touch of a button. The fastest acting non-acid, non-alkali penetrating oil known or money back.

### 3. ECONOMICAL

Spray container eliminates wasted surplus and time in application. Cannot leak or spill.

### 4. HANDY

Carried easily and is always ready for use. No chance for ingredients to weaken by exposure to air from a misplaced cap.

### 5. VERSATILE

Marla Spray Penetrating Oil is used to free the most corroded bolts, screws, pipe threads, bearings, bushings, pulleys, manifolds, valve guides, locks or any other stuck together metal parts.

**INDUSTRIAL PACKAGING AND PRICE SCHEDULE, F.O.B. ST. LOUIS, MO.**

Case of Six—12-ounce Cans . . . \$9.00 Case of Twelve—12 ounce Cans . . . \$17.40

**Rothlan Corp., 3618 Laclede Avenue, St. Louis 8, Mo.**

SPECIALISTS IN FINE PENETRATING OIL FOR OVER THIRTY YEARS

## Boost Titanium Capacity

A further expansion in titanium metal production capacity at the Henderson, Nev., plant of Titanium Metals Corp. of America has been announced by National Lead Co. and Allegheny Ludlum Steel Corp., parent companies.

Sponge output will be increased 50 per cent and related melting facilities for the production of titanium ingot will be expanded by 80 percent.

Earlier this year, Titanium Metals Corp. announced a program to increase its original plant output of ten tons per day by 67 percent. When both expansion phases are completed late next year, total capacity of the Nevada unit will be 25 tons per day of titanium sponge. Ingot capacity will be 30 tons per day. The over-all cost of expansions is estimated at \$15,000,000.

## Pueblo Phosphate Plant

Monsanto Chemical Co., St. Louis, Mo., has started construction of a phosphoric acid plant at Pueblo, Colo., near facilities of the Colorado Fuel & Iron Corp.

The plant will produce diammonium phosphate, to be marketed by CF&I under the trade-name of DAP. The phosphoric acid produced in the new

unit will be used in the recovery of ammonia from gas coming off CF&I's 266 coke ovens. Use of phosphoric acid in place of sulfuric acid for recovery of ammonia from coke oven gases was pioneered by CF&I last year.

Phosphoric acid will be produced by burning elemental phosphorus produced by Monsanto at its electrical furnace operation at Soda Springs, Idaho.

The new Pueblo plant will be owned jointly by Monsanto and CF&I.

## Alaska Sulphur

The geology of massive sulfide deposits near Horseshoe Bay on Latouche Island in the southern part of Alaska is described in a Geological Survey Bulletin.

These deposits, composed almost entirely of pyrite, were previously explored in the early 1900's to determine whether they could be developed as a source of copper ore. Today the major interest in the sulfide deposits is the possibility of producing sulphur from the massive sulfides. Replacement lenses of sulfide lie on the flank of a plunging anticlinorium in marine sedimentary rocks of possibly late Mesozoic age. Lenses of these sulfides ex-



posed in old mine workings range in width from a few inches to as much as 60 ft, and in length from less than one ft to at least 490 ft. The maximum size of these bodies is not definitely known as none of the workings reached the limits of the mineralized zones.

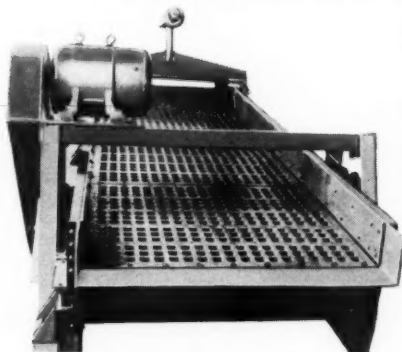
Copies of the Bulletin, "Pyrite Deposits at Horseshoe Bay, Latouche Island, Alaska," Geological Survey Bulletin 1024E, may be obtained for 45 cents from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

## Montana Sulphur Operation

Montana Sulphur & Chemical Co., Billings, Mont., is now operating a sulphur manufacturing plant with a capacity of 40 long-tons per day. Sulphur will be produced from hydrogen sulfide gases obtained from Carter Oil Co. and Continental Oil Co.

# Hendrick Quality Steel . . . . . Passes Every Test!

The use of Hendrick H Quality Steel Perforated Plate on vibrating screens can often mean the difference between profit and loss. Hendrick Perforated Metal Plate really stands up under continuous heavy-duty usage . . . screens easier, faster and with less time out due to blinding.



Secret of Hendrick's success is our 80 years of experience in selecting and specifying the various analyses of steel best suited for the mining industry. Hendrick perforated H quality steel is supplied in flat, corrugated or stepped with any desired shape and size of perforation. For more information write Hendrick direct.

**Hendrick—Pioneer Perforator of Quality Steel for 80 Years!**



## Hendrick

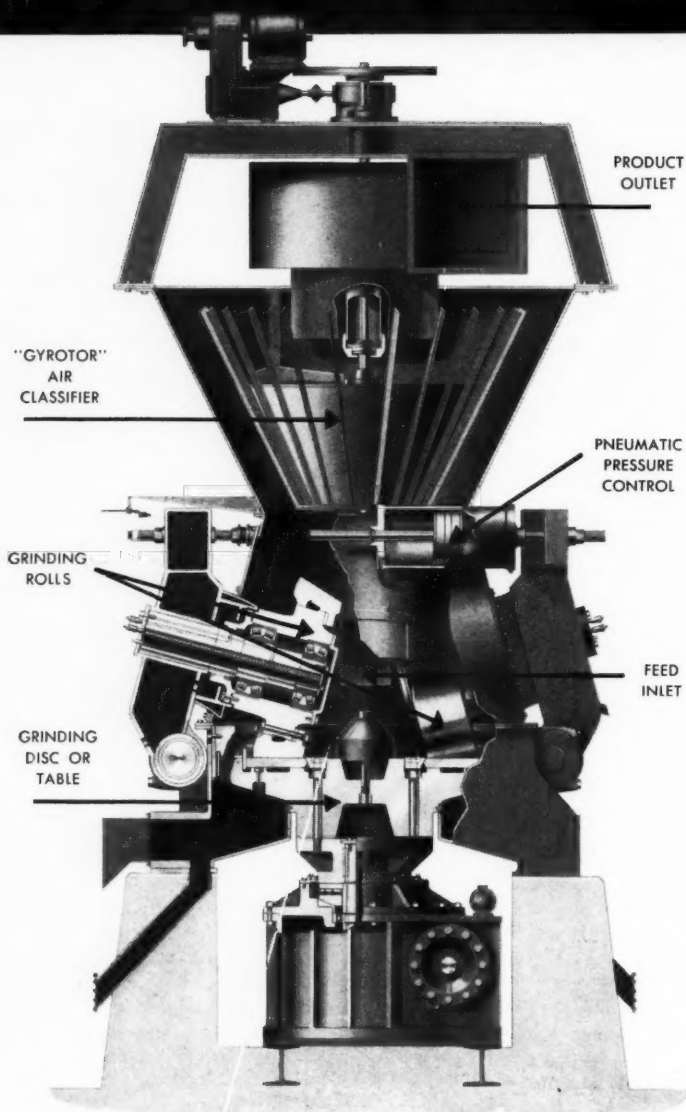
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Perforated Metal • Perforated Metal Screens • Wedge-Slot and Hendrick Wedge Wire Screens • Architectural Grilles • Miteo Open Steel Flooring • Shur-Site Treads • Armorgrids • Hendrick Hydro-Dehazer

# DISC-ROLL MILL



The Hardinge Disc-Roll Mill is a roller-type mill with two adjustable, pneumatically loaded rolls for grinding material on a horizontal rotating disc or table (Loesche type). The Hardinge "Gyrotor" Air Classifier, in combination with the mill, provides a complete grinding, classifying, and drying system. A full description is given in Bulletin 52-52.

## HARDINGE

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### Atlas Joins Uranium Reduction Co.

Uranium Reduction Co., owner of the uranium milling facility now nearing completion near Moab, Utah, has announced that it has agreed to sell an equity interest approximating 30 percent to Hidden Splendor Mining Co., wholly owned subsidiary of Atlas Corp., subject to both parties meeting certain conditions by October 15.

Under the agreement, Hidden Splendor Mining Co., in addition to purchasing the 30 percent equity interest, agrees to put certain funds into Uranium Reduction Co. which in the Company's opinion will be sufficient to meet all of its presently foreseeable capital requirements. Hidden Splendor is making this investment instead of proceeding with the erection of its own mill at La Sal, Utah. Accordingly, the ores from mines previously committed to its proposed mill will be delivered to Uranium Reduction Co. for concentrating.

The three largest stockholders of Uranium Reduction, under the new agreement, include Utex Exploration Co., Hidden Splendor Mining Co., and American Zinc, Lead and Smelting Co., which manages Uranium Reduction and its operations.

### Australian Bauxite

Substantial deposits of bauxite ore have been discovered on the Gulf of Carpentaria coast of Cape York in northern Australia, according to a report from the Broken Hill Mining Co. of Australia. The deposit is reported to be 9 ft deep and to cover 200 sq. mi.

### Canadian Molybdenum

Molybdenite Corp. of Canada has accepted an offer of an option to purchase stock in and develop Preissac Molybdenite Mines which holds a 2300-acre molybdenum-bismuth property approximately 25 miles north and west of Molybdenite Corporation's producing property at Lacorne Township, Que.

Paul Ranger, Molybdenite Corp. president, says his company has a four-year exclusive option on 750,000 shares of Preissac stock. This option provides that Molybdenite takes charge of all mining and milling operations at Preissac and also looks after the marketing of the products to be derived from Preissac ore.

According to Ranger, about 600,000 tons of molybdenum-bismuth ore of profitable grade have been indicated. In accordance with results which are expected, Preissac will proceed with construction of a concentrating mill of an initial 600-ton daily capacity.

The molybdenite to be extracted will be treated in Molybdenite Corporation's converting plant at Lacorne which is expected to begin operations in September. Bismuth will be treated at Molybdenite Corporation's smelter.

## Reactive Antimony Smelter

Bradley Mining Co. has reactivated its antimony smelter at Stibnite, Idaho, to handle approximately 2000 tons of cathode antimony metal owned by the Sunshine Mining Co. Test runs had indicated the Stibnite plant could successfully remove the arsenic content of about 3½ percent.

Bradley had previously contracted for the sale of its antimony mill at Stibnite.

## Mill Destroyed by Fire

The mill at the Holly Minerals Corporation's mercury mines, Stibnite, Idaho, was destroyed by fire August 19.

The fire broke out in hot ashes of the slagpit and quickly destroyed the mill, one crusher and several ore bins. Damage was estimated by company officials at \$150,000.

## USBM Chrome Report

Recent Bureau of Mines studies show that low-grade chrome ore from the John Day area of Grant County, Ore., can be smelted to yield ferrochrome-silicon, used as an alloying metal in steel-making, or blended with magnesite to produce refractory brick. The Bureau report also describes three deposits in the area—Iron King, Chambers, and Dry Camp—where several years ago the Bureau outlined an estimated 208,000 tons of ore averaging 22 percent chromic oxide.

Electric-furnace tests on the ore to make ferrochrome-silicon were conducted at the Bureau's Electrometallurgical Laboratory, Albany, Ore., while refractory brick was made at the Bureau's Northwest Experiment Station, Seattle, Wash.

Use tests on the brick were performed under a cooperative agreement with the University of Washington. After preliminary trial at the station, refractory brick from Oregon and Montana chrome ore mixed with magnesium oxide was put into service in the bulkhead of an open-hearth furnace of the Bethlehem Pacific Coast Steel Co., in Seattle. Its performance equalled that of commercial refractories of the same type, researchers reported.

While demonstrating the technical feasibility of the two processes for using the John Day ore, the report notes that their economies are yet to be determined. It also points out that there has been little production of chromite in this country except under the stimulus of Government at over-market prices.

A copy of Report of Investigations 5238, "Exploration and Utilization Studies, John Day Chromites, Oregon," can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

# The tough ones come to Card



## How HOMESTAKE solved two HAULAGE PROBLEMS

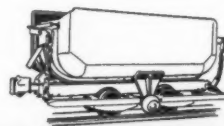
When Homestake Mining Company needed larger haulage capacity, Card engineers were called in. At Homestake, ore cars are automatically dumped while in motion, and haulage ways are limited in cross section. So, special Granby-type cars were chosen to replace the old gable-bottom cars.

Since 1939, 390 of these special Card cars have gone to Homestake on eight successive orders. Designed for maximum capacity, they have only a very minimum of side clearance. They are fabricated wholly of Cor-Ten plate and hold 60 cu. ft. Greatest design change over the years has been to a heavier liner plate to allow loading without the degree of ore fragmentation originally planned. Originally the cars were loaded through 14" grizzlies. Now they are loaded with the largest sizes that will clear the chutes.

Card has recently furnished 61 special Rocker Dump cars for development work at Homestake. These are well suited to handling waste and dumping in old stopes.

### WHERE MINING CALLS

for efficient haulage, Card cars are the tested answer. Join Card's many customers. Their repeat orders are added proof of quality for you. Card engineers are at your service . . . no obligation.

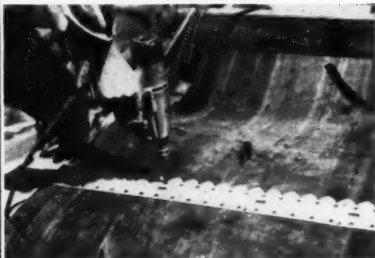


## C.S. Card Iron Works Co.

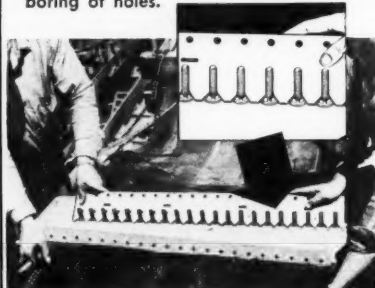
2501 WEST 16th AVE.,  
DENVER, COLORADO

# NEW FLEXCO POWER TOOLS CUT APPLICATION TIME IN HALF

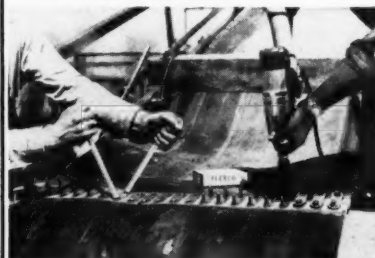
Your two man belt team can now join a belt 30" wide in 15 to 20 minutes . . . using the new FLEXCO Power Tools.



The FLEXCO Power Tool Boring Bit used with electric or air impact tool speeds boring of holes.



New FLEXCO Templet positions bolts for quick joining of belts. Reaching under belt has been eliminated.



Running down nuts is fast with the new FLEXCO Power Wrench used with electric or air impact tool. Two Bolt Breakers are used together to complete the joint.

If you are interested in speeding up fastener application, order the new Power Tools from your local FLEXCO Distributor. Write for Bulletin F-112-A.

**FLEXIBLE STEEL LACING CO.**

4675 Lexington Street • Chicago 44, Illinois

## New Park Closes

New Park Mining Co. has suspended operations at its Park City district lead-silver-zinc properties. W. H. Cranmer, president, said some 290 miners are affected by the closing. He said it is the first time work has been suspended in the mine since he opened it in 1932.

As a result of the action, only the United Park City Mines Co. remains as a principal producer in the historic Park City district.

Mr. Cranmer said the mine will be closed for "an indefinite period of time." He said operations have been losing money every month so far this year, and blamed the suspension of operations on the growing imports of lead and zinc produced by "low wage foreign mines many of which have been subsidized by outright grants from our own country."

## Uranium Feed Proposal

Kennecott Copper Corp. and Koppers Co., Inc. have announced they will submit a joint proposal to the Atomic Energy Commission to produce uranium feed materials.

The proposal calls for the design, construction and operation of a feed materials processing plant with an annual productive capacity of up to 5000 tons of uranium salts.

If approved by AEC, it is reported the plant will be located in the Middle West near a large supply of fresh water.

## Polaris Diversifies

Polaris Mining Co. has entered the manufacturing field, in association with Accesso Systems, Inc., of Seattle, Wash.

The move was prompted by the lack of new ore discoveries, both in the company's Silver Summit mine between Wallace and Kellogg and in the adjoining Omega-Rothbart areas, which are mined by Sunshine Mining Co. and in which Polaris has a participating interest.

The agreement with the Seattle firm, which holds exclusive sales and manufacturing rights on a new and unique design for supporting acoustical tile board in a suspended ceiling, provides that Polaris will advance \$255,000 to Accesso and in return receive a two-year option to apply the loan to the purchase of a 73 percent stock interest in the corporation.

Polaris is assured of managerial control of the Accesso concern during the option period. Robert E. Sorenson, Polaris director and chief geologist, has been appointed president and general manager, and L. J. Randall, Polaris president, has been named vice-president. Directors are Sorenson, Randall, Charles A. Tilford, a Polaris director; J. L. McCarthy, a director of Hecla Mining Co., Polaris' parent firm, and Richard W. Seed.

## For Sale

One 22 HD Sullivan Core Drill Complete with Power Unit; Excellent Condition. Priced for Immediate Sale.

**MONONGAHELA  
MACHINERY & EQUIPMENT CO.**  
Box 250 Monongahela, Penn.

## Kansas Mine Production

Kansas, the traditional wheat state, produced \$137,500,000 more in minerals in the four-year period from 1950 to 1954 than it produced in wheat, according to a University of Kansas report.

Mineral production during the four-year period was \$2.1 billion compared with \$1.9625 billion in wheat production. Eighty-five percent of the mineral value extracted was oil, natural gas, coal and petroleum products; non-metals, such as cement, clay, salt, stone, sand and gravel totaled 13 percent; and metals, chiefly lead and zinc, accounted for two percent.

## May Use Oregon Coal

The coal industry has been heartened by the announcement of Pacific Power & Light Co., Portland, Ore., that it plans to spend between \$300,000 and \$400,000 on a study of the economics of using coal from a 50,000,000-ton bituminous deposit in Coos County, Ore., to fire a proposed 100,000-kw station. Successful culmination of the company's plans would be the first utilization of coal to generate electricity in Oregon history.

Earlier this year Tampa Electric Co., Fla., contracted with West Kentucky Coal Co., Madisonville, Ky., for fuel to supply Tampa Electric's new Gannon station. This was the first choice of coal as a utility fuel anywhere in the State of Florida.

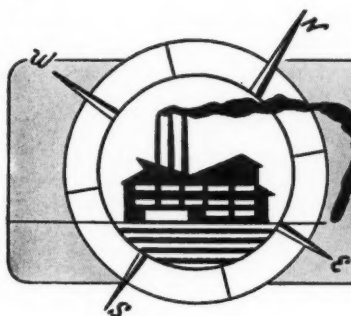
It is interesting to note that in 1955 the use of coal in utility plants rose 20 percent in volume and declined four percent in cost.

## Mill and Mine Acquired

British Western America Uranium Corp. has acquired the Greater Minerals Corp., which owns a 150-ton-per-day ball mill at Georgetown, Clear Creek County, Colo., and which has been operating the Grizzly Mine near Silver Plume. The purchase involved a consideration of \$400,000, payable in cash and net smelter returns, according to officers of British Western America.

The company plans an extensive development program for the Grizzly Mine and a stepped-up milling operation to a maximum of 150 tons per day.

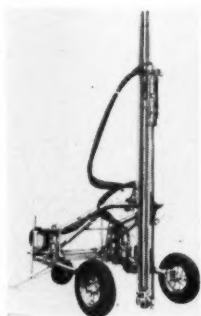
Greater Minerals will continue to operate as a wholly-owned subsidiary of British Western America.



# Manufacturers Forum

## Wagon Drill

DESIGNED FOR VERTICAL OR HORIZONTAL DRILLING in hard formations, the DR 40 features, according to the manufacturer, a feed



shell behind the center line of the wheel axles to provide a more substantial drilling carriage and an air motor feed that eliminates most sticking of steel. The entire unit, including feed and D14DR four-in. drifter, weighs 1500 lb.

It is manufactured by the Le Roi Division of Westinghouse Air Brake Co., Milwaukee 1, Wis.

Recommended for use with the wagon drill, the D14DR drifter weighs 126 lb. It is used with a 13-ft feed shell weighing 400 lb and having a feed travel of ten ft. It is said to be possible to drill holes at any angle in any direction to a depth of 24 ft without using steel racks.

## Mill Bearings

AVAILABLE FOR shaft diameters ranging from  $2\frac{7}{16}$  to 11 in., Link-Belt mill bearings, with self-aligning roller bearings and steel housings, are said to be capable of withstanding severe



radial and thrust loads. They can be furnished with one of three seal arrangements: (1) steel labyrinth seals for use with oil or grease; (2) combination felt and synthetic rubber contact-type seals for use with grease

only; and (3) double seals on bearing sizes  $7\frac{1}{2}$  in. bore and larger.

The Link-Belt mill bearing line is described in Book 2665, which is available from Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill.

## Truck Tire

WITH A STEEL WIRE SHIELD between tread and carcass, the Super Fleetmaster was designed especially for transit mixers, dump trucks and heavy service equipment used in logging, mining, quarrying and road construction, according to the United States Rubber Co.

The steel shield reportedly protects the tread from cut and rupture dam-

**Inquiries about new equipment appearing in Manufacturers Forum are welcomed.**

**For additional information on any piece of equipment in this section write directly to the manufacturer, or to Mining Congress Journal with name of item and date of issue in which it appeared.**

age, and virtually eliminates groove cracking.

Other features claimed are an extra-deep tread; wide angle grooves to minimize stone retention; deep wide shoulder lugs that are useful for off-the-road traction and to help reduce running temperatures on highways; three-rib tread that increases stability and improves steering; and a new tread compound that makes the tire resistant to chipping, snagging and cuts.

These tires will also be constructed in tubeless design.

## Solder Fluxes

NON-CORROSIVE, quick wetting solder fluxes designed primarily for use on copper and copper base alloys are now being manufactured by Federated Metals Division of American

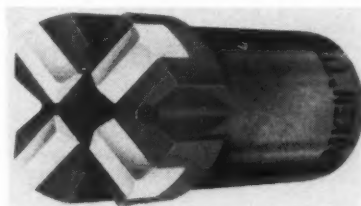
Smelting & Refining Co., 120 Broadway, New York 5, N. Y. These fluxes utilize safe-to-handle derivatives of the war-born chemical, hydrazine, and are known as Federated H-Series Solder Fluxes.

Some advantages claimed are excellent solder spread characteristics, almost no residue produced, washing or cleaning can be eliminated and pre-fluxing for production economies.

Other metals, like steel, aluminum, zinc and stainless steel can be soldered with these fluxes if they are first coated or plated with copper, tin, solder or silver.

## Rock Bits

THE TAPERED SOCKET carbide insert rock bits offer several advantages, according to the Timken Roller Bearing Co., Canton 6, Ohio: they can be removed from the drill steel and discarded without throwing away the drill steel; the four-point cross bits



give longer life and greater footages between sharpenings; and the tapered pin is easily fabricated on the drill steel. The manufacturer announced that this line of rock bits is to be manufactured at Colorado Springs, Colo., and comes in answer to the increasing use of light air-leg drills both in this country and in Canada.

## Thor Plans Move

PLANS have been made to move executive administration offices of the Thor Power Tool Co., Aurora, Ill., to the new Prudential Building, Chicago. All executive officers in the company's management and sales groups, and division managers in sales and promotion, will be involved in the transfer which is slated for October or November of this year.

## Shovel and Crane



A  $\frac{3}{4}$ -YD SHOVEL and 18-ton crawler crane has been announced by Marion Power Shovel Co., Marion, Ohio. It will be known as the 35-M and will be offered both with crawler and truck mountings. This truck crane will be known as the 35-MR and is rated at 25 tons.

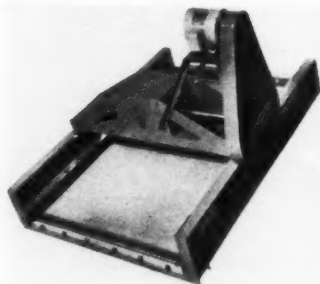
Some of the principal design and construction features, according to the

manufacturer, include fast and easy convertibility of front-end equipment (shovel, dragline, clamshell, crane and hoe) without any machinery changes; low maintenance, self-cleaning, non-clogging crawlers; independent boom-hoist for power up, power down control of the boom as standard equipment; and anti-friction bearings on high speed rotating parts and hook rollers.

## Motor Mount

FOR MEETING CERTAIN CONDITIONS OF INSTALLATION, a special motor drive mounting for the Model E Leahy Heavy Duty Vibrating Screen has been announced by The Deister Concentrator Co., Fort Wayne, Ind.

The company is not substituting the High Motor Mount driving arrangement for the standard drive offered with the Model E Leahy Screens. The standard type of drive arrangement requires the motor to be supported on an outboard bracket. When screens are paired, they are naturally installed with right and left hand drive so that on two adjacent screens the drives are to the outside.



While it is impossible to eliminate the projection of the sheaves, V-belt and guard of the motor drive from extension beyond the side edge of the screen frame, the High Motor Mount permits swinging the motor inward, to eliminate that extension, and leaves only the width of the drive guard as a projection that is absolutely necessary.

Where a large number of screens are to be placed as close as possible, side by side, in a battery to save room, there is a very tangible advantage in space saving through this new motor drive mounting. There are also instances where it may be desirable to get the motor mounted at a greater distance from the screen cloth where material is processed, and this the new motor mount readily accomplishes.

## Quick Starting

A PERMANENTLY INSTALLED device which reportedly provides quick starting for all gasoline and diesel engines, Start Pilot injects a small quantity of ignition-promoting fluid as a fine spray, mixed with air, into the engine intake manifold. It is claimed that this supplies quick starts, even at temperatures as low as minus 60° F., saves engine wear, lengthens battery life and keeps the engine firing until the regular fuel source can sustain combustion. The Start Pilot unit uses a special low ether content blend of Sure Fire Motor Starting Fluid packed in hermetically sealed capsules.

The Start Pilot kit consists of the main unit containing the capsule chamber and the hand-operated double action air pump, a spray nozzle which is screwed into the engine intake manifold and copper tubing which connects the pump unit to the spray nozzle.

Request information from Wilco Co., 4425 Bandini Blvd., Los Angeles 23, Calif., or Start Pilot Corp., 258 Herricks Road, Mineola, L. I., N. Y.

## Portable Rotary Compressor

FULLY EQUIPPED WITH TOOL BOXES, fenders, and two-wheel spring-mounted running gear, the Gyro-Flo 85 weighs 1840 lb. As a truck-mounted unit, the 85 cpm compressor weighs 1375 lb and stands 42 in. high. This new size is driven by the Continental Motors F-140 gasoline engine.

For additional information, write to Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., and request Form 2307.

## Underground Mining Tractor

DESIGNED AND EQUIPPED FOR UNDERGROUND MINING OPERATIONS, this TD-9 crawler tractor Skid-Shovel uses the following attachments: a standard 1½-cu yd bucket, plus a narrow 46-in. bucket for



tram car loading, straight and angle dozer blades, pallet fork lift for mounting of platform for drill jumbos on roof bolting, special buckets and the Four-In-One . . . 'dozer, clamshell, bucket and bullclam. For extremely heavy-duty work, International bulldozer or Bullgrader blades with separate outside push frames also are available.

Introduced by the International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill., the 71 hp diesel crawler has an exhaust gas scrubber and cooler, and an exhaust gas diffuser operating with the regular blower-type fan and a 40-gal water reserve tank.

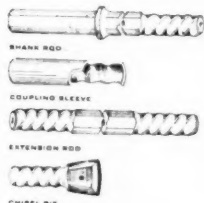
The TD-9 was designed primarily to meet the U. S. Bureau of Mines' standards for non-coal operation. It is six ft high and has a scrubbing system designed by the Drott Manufacturing Co. Milwaukee, Wis.

## Low Cost Oxygen for Mesabi

A PLANT representing a new concept in oxygen supply systems will be installed for use in taconite mining of the Mesabi Range, at Aurora, Minn., by Linde Air Products Co., a Division of Union Carbide and Carbon Corp. This large volume, low cost oxygen supply system will be the exclusive feature of an oxygen supply contract signed recently by Erie Mining Co. and Linde. When installed, Linde's new system will provide large quantities of gaseous oxygen for jet-piercing machines in the Erie Mining operations on the range.

## Drill Steels

THESE 3/8-IN. ROPE-THREADED hexagon steels are said to have been engineered for both long-hole mine drilling and shallower-depth construction industry quarry blasting. The Swedish Coromant steels are



collared to fit the 3/8-in. by 4 1/4-in. chucks of all standard rock drills. Shank rods are available in lengths up to 8 ft 6 in., for

coupling directly to a detachable bit or to extension rods offered in 2 ft 7 in. to 10 ft 6 in. lengths.

Illustrated literature is available from Atlas Copco Pacific, 930 Brittan Ave., San Carlos, Calif., and Atlas Copco Eastern Inc., Paterson, N. J.

## Decentralization

KENAMETAL INC., manufacturer of cemented carbide products, has announced the purchase of a 1200-acre tract of land near Latrobe, Pa., for the expansion of manufacturing facilities and to permit further decentralization to minimize damage from future floods.

The company plans to develop the area at once and has already awarded a contract for construction of the first unit.

The new installation, expected to be in production by the end of the year, will provide about 25,000 sq ft of floor space and will be utilized for grinding and finishing of special or custom-fabricated carbide products.

## — Announcements —

Gilman Y. Murray now heads up the sales activities for the Western District of Western Knapp Engineering, and engineering, design and construction division of Western Machinery Co.

Dorr-Oliver announces the retirement of Robert C. Campbell, assistant to the vice-president in charge of International Administration and the succession of Henry W. Hitzrot to this position.

Lee A. Paris, assistant to the general manager, E. J. Longyear Co., has been elected assistant secretary.

Richard C. Miller, vice-president of Southwestern Engineering Co., Los Angeles, has been elected to the company's board of directors and assigned the additional duties of assistant to the president.

## CATALOGS & BULLETINS

**ALLOY STEEL TRACTOR PARTS.** *American Manganese Steel Division, American Brake Shoe Co., Dept. T, Chicago Heights, Ill.* Entitled "Manganese Steel Tractor Replacement Parts," the folder illustrates and points out the advantages of Manganese Steel in track shoes, scraper blades, end bits, sprocket and idler rims, and grouser bars. It suggests the economical use of these replacement parts wherever heavy impact and abrasion are major wear problems. The brochure also includes a section on the proper procedure for welding on replacement Manganese Steel sprocket or idler rims.

**TRACTOR SHOVEL.** *Construction Machinery Division, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.* Structural features of the Allis-Chalmers HD-6G diesel powered tractor shovel are discussed, and the shovel hydraulic system of this tractor shovel reviewed in catalog No. MS-1101. Also included are specifications and listing of interchangeable matched attachments designed and engineered to the HD-6G to increase its versatility and performance capabilities.

**PORTABLE CORDS AND CABLES.** *Rome Cable Corp., Rome, N. Y.* Three bulletins are offered. While Catalog Port-1 primarily describes portable cords and cables, data are also included on diesel electric locomotive cable and mine power cables. Bulletin MST-1 gives the manual of procedure for mid-span tapping of neutral-supported triplex secondary cable. Bulletin CW-1 gives conduit weight data.

**MATERIALS HANDLING AND POWER TRANSMITTING MACHINERY.** *Public Relations Dept., Link-Belt Co., Prudential Plaza, Chicago 1, Ill.* This brochure presents a comprehensive idea of Link-Belt's scope, products and the industries it serves. Manufacturer of materials handling and power transmitting machinery, the Link-Belt Co. offers many lines of standard products and engineered equipment. It manufactures processing machinery and designs, erects and equips complete plants or comprehensive materials handling systems in a number of industries. Book 2653 also lists technical literature available from the company.

**STEEL PRODUCTS.** *Advertising Dept., Colorado Fuel & Iron Corp., 575 Madison Ave., New York, N. Y.* The 70-p. catalog describes the company's principal products. The product listing is divided into broad classifications which include semi-finished and hot-rolled steel, heavy and special steel items, rails and accessories, wire and wire products, Wickwire rope, overhead conveying equipment, industrial screens and wire fabrics, hardware products, springs and formed wires, processing belts and various other product lines.

**EMBEZZLEMENT CONTROLS FOR BUSINESS ENTERPRISES.** *Fidelity and Deposit Co., 2208 Fidelity Bldg., Baltimore 3, Md.* Practical methods of combatting embezzlements of money, merchandise and other materials are described in this 32-pp booklet by Lester A. Pratt, C.P.A., nationally-recognized authority on fraud prevention. It contains a check list for determining the adequacy of a firm's embezzlement controls. Requests for booklet must be made on business letterheads.

**END-SHIELD BEARING SYNCHRONOUS MOTORS.** *Allis-Chalmers Manufacturing Co., 972 S. 70th St., Milwaukee, Wis.* Construction features of these large motors are described in Bulletin 05B8305. The motors are said to meet the growing demand for a high degree of protection, combined with maximum accessibility for a variety of direct-connected or geared applications to drives for centrifugal blowers, compressors and fans, centrifugal pumps, coal pulverizers, grinding mills and other equipment.

**HOW TO INSTALL PIPE.** *Johns-Manville, 22 East 40th St., New York 16, N. Y.* "How to Install Johns-Manville Transite Pressure Pipe for Overhead Industrial Water and Process Lines," is the title of a new guide that covers such items as hanging and supporting the pipe, bracing for thrusts, the poured flange coupling and the Roto-Split flange coupling. The guide includes diagrams of typical Transite systems for overhead lines.

**THE 26TH ANNUAL ADDITION TO THE FLOTATION INDEX.** *Mining Chemical Sales, The Dow Chemical Co., Midland, Mich.* A bibliography of articles of special interest to the mining and milling industry appearing in 1955, the index lists articles on the subjects of flotation research, including chemistry and theory of flotation and flotation reagents, mineral dressing, heavy-media separation and milling operations. It was compiled from world-wide mining publications as a reference service to the industry by Dow's mining and metallurgical personnel.

**HALLOWELL SHELVING.** *Hallowell Div., Standard Pressed Steel Co., Jenkintown, Pa.* Tips on how to plan installations and order shelving in more than 1000 combinations to fix any storage or supply-handling need are summarized in this catalog.

**WHEELER-ECONOMY PUMPS.** *C. H. Wheeler Mfg. Co., 19th & Lehigh, Philadelphia 32, Pa.* Recommend for general service wherever liquids of low viscosity are to be moved, Wheeler-Economy double suction single-stage centrifugal pumps are described and illustrated in Catalog A-156. Cross section drawings and construction details for standard sizes up to 10-in. discharge are included.

**INDUSTRIAL SPRAY NOZZLES.** *Monarch Mfg. Works, Inc., 2501 East Ontario St., Philadelphia 34, Pa.* Catalog I contains illustrations and data on the company's industrial spray nozzles and accessories. Monarch's line of strainers and industrial oil burner nozzles are also described.

**PLASTIC PIPE AND FITTINGS.** *Alloy Tube Div., The Carpenter Steel Co., Union, N. J.* Two types of unplasticized polyvinyl chloride pipe and fittings are described. One type is a normal impact grade, and the other a high impact grade. Applications are listed and installation instructions given. The full range of corrosion resistance is also defined.

**CATIONIC FLOTATION.** *Armour & Co., Chemical Div., 1355 West 31st St., Chicago 9, Ill.* "Mineral Flotation with Armour Cationic Chemicals" reportedly contains the latest fundamental data on the subject. Topics include a review of (Continued next page)

the principle of cationic flotation, chemicals used, conditions needed for successful flotation and the advantages inherent in cationic chemicals.

**HI-VI VIBRATORY EQUIPMENT.** *Eriez Manufacturing Co., Erie, Pa.* Brochure VB-1 describes electro-permanent magnetic vibratory equipment and the HI-VI design which incorporates a lifetime permanent Alnico magnet and an a-c electro-magnet. Various applications for HI-VI Feeders are listed and operating advantages noted.

**WELDING PRODUCTS.** *Taylor-Wharton Div., Harsco Corp., High Bridge, N. J.* Entitled "Tisco Timang Manganese-Nickel Steel Welding Products," Bulletin 3-56-1M provides prices and stock sizes of Tisco welding products including rods, hot-rolled plates, special shapes, wedge bars, tooth repointers and application bars. In addition, the catalog contains application information pertinent to the products covered.

**VIBRASWITCH MALFUNCTION DETECTOR.** *The Beta Corp., P. O. Box 8625, Richmond 26, Va.* The four-page Bulletin 500-1 A describes the company's line of manually reset vibration monitors and malfunction detectors. Included is detailed information on how vibration

monitors detect malfunctions in rotating equipment and how the devices are installed and adjusted. The bulletin includes half-tones, dimensional drawings and tabulated features on standard, oil-tight, and explosion-proof models.

**ELECTRIC TYPEWRITER.** *Remington Rand, a division of Sperry Rand Corp., 315 Fourth Ave., New York 10, N. Y.* Correspondence as individual as an executive's own signature is said to be possible with the new Remington Electric Typewriter, described in Booklet No. RE-8811. The machine offers a wide selection of type styles plus many improvements. Interchangeable type provides specialized typing of any kind plus "everyday" typing.

**HOSE ACCESSORIES.** *Hose Accessories Co., 2700 No. 17th St., Philadelphia 32, Pa.* Entitled "Le-Hi Condensed Catalog No. 18," the booklet covers all Le-Hi hose couplings, hose clamps, hose supplies, valves and manifolds—for tunneling, mining, quarrying, contracting, construction and general industry applications.

**HYDRAULIC SYSTEMS AND COMPONENTS FOR ALL MOBILE EQUIPMENT.** *Vickers Inc., Box 302, Detroit 32, Mich.* Describing oil-hydraulic systems and components for all mobile equipment

in the truck and bus, construction machinery, material handling, agricultural and allied industries, Bulletin M5101A contains discussions of performance characteristics, design features, construction details and applications for the Vickers line of single and double vane pumps, power packs for mobile equipment, multiple unit valves, relief valves, reservoirs, fluid motors and power steering boosters.

**SELECTING AN ENGINEERING FIRM.** *The Teller Co., Butler, Pa.* This guide for selecting an engineering firm has been prepared for those who are responsible for their company's entering new product fields, for plant automation, modernization or expansion, and for those who need outside engineering help. It sketches the criteria for determining whether the present engineer staff is adequate to do the job, and then outlines guide posts for selecting an outside engineering firm.

**MINING TOOLS AND METHODS.** *Advertising Dept., Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.* The revised edition of the "Carmet Mining Tool Catalog and Methods Manual" includes data on tool design, size and shape of the mining bits, roof drills and coal drills. A special section gives instructions and diagrams on the proper method of regrinding and sharpening mining tools.

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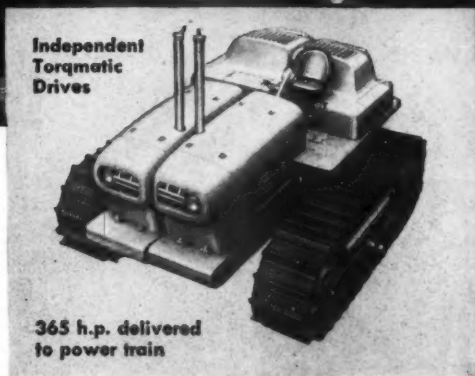


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FOR MOVING EARTH, ROCK, COAL AND ORE





**If this filament  
burns out**

**...this filament  
restores Full Light!**

## **Man-hour protection for working crews . . . the Edison R-4 double-filament bulb**

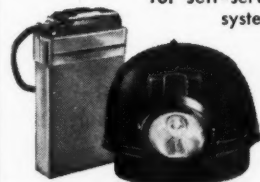
This working crew enjoys greater underground safety, more productive man-hours because the Edison R-4 double-filament bulb is on the job.

Miners equipped with this bulb know that burn-out doesn't mean blackout. If one filament burns out, a turn of the switch transfers the power of the unfailing Edison battery to the second filament—continued, brilliant illumination is restored for the full shift. There's no lost time for

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